THE OPERATOR AND
ELECTRICAL WORLD
A Journal for Telegraphists Telephonists Electricians and Electrical Engineers

VOL. XIV.—No. 8. NEW YORK, FEBRUARY 24, 1883. PUBLISHED WEEKLY. $2 A YEAR; 5 CENTS PER COPY

A CRUEL DEED.

A maiden, innocent and fair,
Worked on the Freshtown wire,
And to the operator there
Expressed her fond desire

That, should he happen into town,
He would drop in to see her ;
Nor marked that this was noted down
By others sitting near.

A week has passed. On the fifth floor
Is seen a handsome man.
Some naughty girls beside the door
Invent a wicked plan,

And straightway they the maiden tell
A stranger waits to meet her.
Then thinks the innocent young belle
Tis "Freshtown," come to greet her.

She hastens out, with joyous glee,
And smooths her golden hair,
Then goes down very bashfully
And sees the stranger there.

She gazes at him lovingly,
And to his side she rushes ;
Speaks low : "D'you want to see 'Qz ?'"
The handsome fellow blushes,

Then lifts his beaver hat, and says :
"I beg your pardon, miss ?"
His answer throws her in amaze ;
She'd not expected this.

"I say, d'you want to see 'Qz ?'"
The stranger seems perplexed.
"I do not understand." Then she
Is most sincerely vexed.

Her azure eyes flash out like fire ;
She says : "Now look 'e here !
You're not so stupid on the wire.
What makes you act so queer ?

"I'm Miss St. Clair. At any rate,
Ain't you an operator ?"
He bows : "Oh ! not at all ! I wait
To take the elevator !"

KARL.

Electric Lighting.—XVII.

The temperature of the voltaic arc is extremely high, as was shown by Sir Humphry Davy; it is higher than the fusing point of platinum, which can scarcely be melted in the oxy-hydrogen flame. The voltaic arc is, indeed, the source of the greatest artificial heat with which we are acquainted. Many attempts have been made to determine its absolute temperature, but the question is not yet definitely settled, as the diversity of results obtained by various physicists shows, the figures ranging between 2,000° and 6,000° Centigrade. The results most generally accepted are those of an Italian physicist, Rosetti, which represent a mean between the two extremes. This observer has found that the temperature varies in different parts of the arc; thus the carbons are always hotter than the arc itself, and of the two carbons the positive one is uniformly hotter than the negative one. The size of the carbons used and the strength of the current passing likewise influence the temperature greatly. However, M. Rosetti asserts that the temperature of the positive carbon must be at least 3,200° C., and that of the negative 2,500° C., under ordinary conditions. This difference of temperature between the two carbons is influenced by the character of the current, however; with alternate currents it disappears altogether, and both carbons are alike in all respects, as could be expected; with currents that are very wavy and broken in character the difference is also much smaller than with strictly unbroken currents, because the action of such currents approaches somewhat to that of alternating currents.

The heating power of the voltaic arc has been put to profitable use by Dr. Siemens in his "electric furnace," by which he proposes to melt steel and iron. The apparatus is just as simple in construction as it is in principle. It is nothing more than the voltaic arc produced in a crucible. Inside of a crucible the metal to be melted is placed ; this metal forms connection with one pole of the generator through the crucible or otherwise, while a large carbon passing through the lid forms the other connection. The arc is established directly between the metal and this carbon, so that the heat acts upon the mass in its greatest

FIG. 66.

intensity ; the current used is generally of large volume, say 100 ampères, and the heat evolved is sufficient to melt the metal in a few moments.

A very noticeable feature, on examining the carbons while the arc is constant between them, is the presence of minute globules of molten matter at a slight distance from the point, and near the flame. These globules are supposed to be composed of the silicious and other impurities found in the retort carbon used in the manufacture of these carbons ; and they are probably due also to the substances used in the paste for mixing the carbon dust. It is said that when the carbon is chemically pure, or nearly so, no such globules form, and that the light is much more steady. This is quite plausible, for the vaporization of this matter may likely alter the character of the light. These globules are rather more numerous on the negative carbon as a rule. As the carbons burn away, so as to bring the flame nearer these globules, they suddenly dart into it from both carbons, and become vaporized.

A cloud of carbon dust seems to settle on the negative carbon, as becomes apparent when we blow at the arc; and almost always a layer of larger particles, forming a kind of crust, may be seen around the base of the cone formed by the pointed end of the negative carbon. When the carbons are plated with copper this crust appears to be more frequent and more persistent. A part of the matter composing it disappears in the higher heat of the arc, but

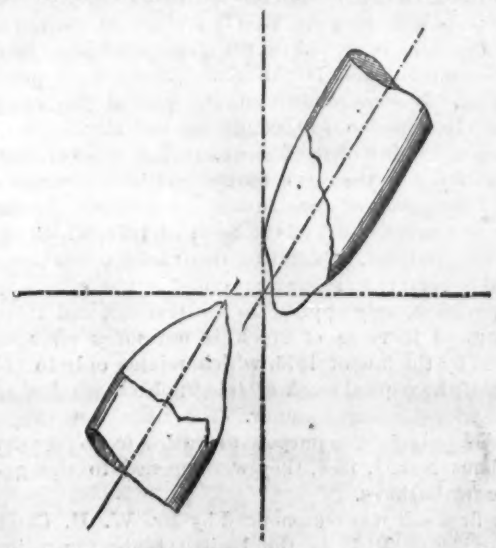


FIG. 67.

a part falls down as ashy residue. Sometimes this crust remains around the carbon as it burns until it becomes included in the arc, and causes the phenomenon which is called "spitting" in the arc. In this condition these crusts are sometimes called "mushrooms." They seem to result more frequently in cases where the arc is too short and where the current is too strong for the size of carbon used, and causes it to heat for a large portion of its length.

It is an interesting fact that the positive carbon wears away about twice as fast as the negative carbon. This peculiarity might be accounted for by the greater temperature which we found to exist at the positive carbon ; but it is also explained by a phenomenon of transference of carbon particles bodily from the positive to the negative. When the carbons burn in the air, and both wear away, we cannot observe this transfer to the negative one; but when the arc is produced in a vacuum, where none of the carbon is consumed, the positive carbon is then seen to become gradually shorter, while the negative carbon, on the contrary, gradually increases in length, and assumes a pointed form, by the deposit of successive layers of particles at its point. It is evident, now, that even if we suppose combustion to take place at the same rate at both carbons, the extra number of particles constantly received at the negative carbon from the positive, makes the negative carbon wear away much more slowly, while the amount lost at the positive carbon by transference helps to make the wear so much greater at that carbon. Many conjectures have arisen as to the cause of this movement of particles across the arc. It has been looked upon as a kind of electrolysis of the carbon. This view is apparently confirmed by two facts; first, the direction of transfer is just the same as the direction of transfer of metals in electrolytic solutions, where the metal is always dissolved at the anode (positive side) and deposited at the cathode (negative side); second, there is a counter electromotive force in the voltaic arc just as is noticed in electrolysis under certain conditions. However, some experiments made in 1873 by Herman Herwig in Germany, refute this hypothesis. He showed that when the current passes between two metallic electrodes in a vacuum the amount of metal lost at the positive bears no relation to the amount of hydrogen decomposed from water in a voltameter by the same current. This is contrary to Faraday's law of electro-chemical equivalence, and proves that the phenomenon cannot be one of electrolytic nature. Faraday's law is that in all electrolytic decompositions, the amount of any element evolved or deposited at one pole is chemically equivalent to the amount of hydrogen decomposed by the same quantity of current in a water voltameter. Now, the chemical equivalent (atomic weight) of carbon being 12, with respect to hydrogen, which is taken as the standard (1), it follows that the amount of carbon transferred should have been twelve times as great as the amount of hydrogen evolved. It was also shown by Van Breda that the transference in the arc was not in reality all in one direction. Van Breda used points of different metals—iron and copper—and found on each some traces of the other after the arc had been produced between them; however, the action from the negative to the positive is extremely slight. Herwig has found that all the particles which leave both carbons do not go the entire way across, but that many become burned in the arc and others fall out of the arc as a cloudy dust.

In all probability, the cause of this exchange of particles is purely physical. In our opinion, it is nothing more nor less than a function of the heat of the arc itself and of its method of diffusion ; in other words, it is a kind of ebullition. We are all familiar with the manner in which water moves about when it is boiled. This commotion is also noticeable in masses of molten metals. We can study it conveniently by heating water in a glass vessel and placing some colored powder in the water. As the heat nears the boiling point the lower molecules of water rise up to the surface with a certain force, while other molecules descend along the sides. Soon the disturbance involves the whole mass ; the water at the bottom is violently urged upward, the sediment being set in motion also ; each molecule seems to dart upward from the point of greatest heat (the bottom) with a rapid impulse, as if under the influence of some repulsive action. It is plausible to believe that we have a precisely analogous phenomenon in the voltaic arc, the extremely high temperature present being very favorable to this action, and the vaporous character of the arc permitting a free movement of the carbon particles. Perhaps it would be still more proper to compare this action of transference to the eruption of a volcano. The analogy is especially good so far as the positive carbon is

concerned, for we have already seen that it has a hollow at the end, which is a kind of crater, in the true sense of the word, since it is in this hollow that the heat and the light are most intense, and because it is from this hollow that the particles are torn off and ejected in the direction of the negative carbon. These abraded particles form, in fact, a kind of lava, a part of which is consumed on its way across the arc, while another part is consumed only after reaching the negative pole, another small part, finally, being thrown out of the arc in ashes. We may presume that a similar eruptive action goes on from the negative carbon as a starting point also, though in very much smaller degree; the difference of temperature which has already been noted between the positive and the negative carbons would thus be in itself a good explanation of the greater transference of particles from the positive carbon.

It is likely that this greater "ebullition" at the crater of the positive carbon may be also the cause of the greater unsteadiness of the arc when the positive carbon is placed below the negative. It is well known that heat in the air produces upward currents or "draughts." It is the variations in these currents that make the flame of a candle flicker. Now, when the positive carbon is below, the natural tendency of the heated vapors to rise and to disturb the arc is increased by the upward eruption from the positive crater, the result being to make the flame swell outward, or to lengthen it out of its course. The arc appears to be more restless and sensitive to variations of current, and it is therefore much more likely to break than when the positive carbon is placed above, in which case the eruptive movement is downward, and counteracts the effects due to the air currents. Mr. Alfred Niaudet has compared the light given in both positions, and he finds that with the same current the arc gives more light when the positive carbon is above than in the reversed position, the figures being 278 and 217 carcels in the instance given. There is another advantage in making the top carbon the positive one; the crater which, as we saw, is the seat of the greatest light, then acts as a concave reflector and directs the light to the ground, where it is wanted; while in the reversed position the greatest portion of the light would be directed upward. When the arc is produced by means of alternate currents, both carbons burn alike and equally, as already stated, they being pointed in appearance somewhat like the negative carbon of the continuous current arc. There is no crater formed on either, and the reflection is just as great in one direction as the other, as much light being directed upward as downward to the ground. This is a positive disadvantage from the economical point of view, especially in out-door lighting. In such cases, reflectors should by all means be disposed above the lamp, so as to deflect the upward rays and send them toward the ground.

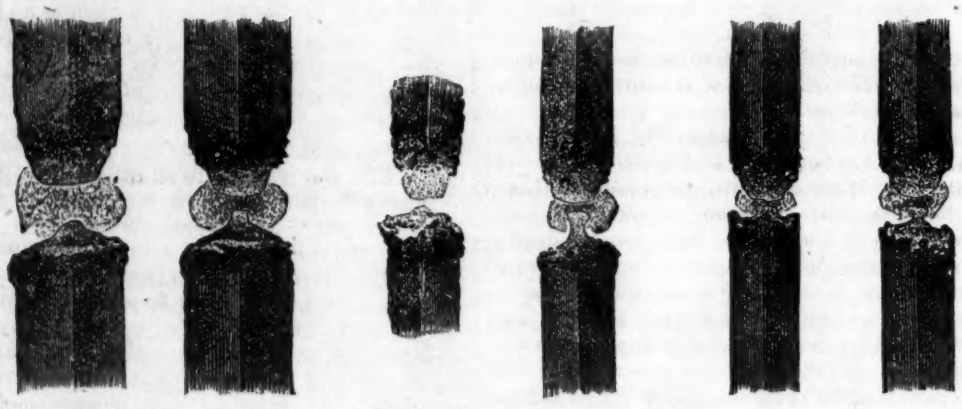


FIG. 68.

By throwing the carbons out of line, as shown in Figs. 66 and 67, the crater on the positive carbon becomes shifted to one side and the arc then throws its light mostly in front of that point, thus concentrating it in one direction. This disposition of the carbons was recommended by Prof. Tyndall and Mr. Douglass as being the most favorable for light-houses, where it is seldom or never necessary to light more than a portion of the horizon at one time. According to Mr. Douglass, the comparative light-giving power of such an arrangement in different directions is shown by the following figures: Immediately in front of the positive crater, 287; behind, 38; on either side, 116. Evidently, then, more light is concentrated on one point by this method. By throwing the carbons still more out of line, the rays of greatest intensity would be projected in a more nearly horizontal direction; but the burning of the carbons between sides would render the adjustment of the carbons, as they burn, very difficult; so another expedient is resorted to. The carbons are kept out of line to the same extent, that is to say, so that their margins are in a line, and both carbons are then inclined (Fig. 67) from the vertical to any angle, this being easily done by mounting both carbon-holders on one frame. In marine projectors and naval search lights, where it is desirable to direct the light to both near and distant objects by changing the angle of projection, this expedient is resorted to with success. In such lamps the currents are very powerful, and the arc is kept long enough so that the negative carbon may not intercept the light radiating from the crater of the positive carbon.

In industrial lighting, this disposition of the carbons out of line would present no special advantage; on the contrary, it would be inconvenient, for it is usually desirable to have the light equal on all sides of the lamp. As the carbons consume, they have to be fed, of course, to maintain the arc even and uniform; but in this case the consumption is so uneven and so peculiar that no automatic regulating mechanism can be depended upon to do the work. The regulation has to be done by hand, and must be watched continually, which is evidently out of question in industrial use.

The manner in which the carbons consume varies greatly, as shown in Fig. 68. It appears to depend on various conditions, such as their purity, density, size, etc.; and also on the current used and whether continuous, interrupted or alternate, as already set forth. It also depends on the length which the arc is permitted to assume. It makes no difference what is the shape of the end of each carbon at starting, for the consumption in the arc will soon give it the characteristic form. Still, it is found that the arc will be produced more easily when the carbons have their ends properly shaped already, and still more when they have already been used. The electromotive force of the current need not be as high under these conditions. It is for this reason that the carbons are always sharpened at one end as they come from the manufacturer.

For a given current when the carbons are of large size (Fig. 68, the two left-hand arcs), the crater of the positive is larger and usually shallower, while the end of the negative carbon is more blunt than with smaller carbons. With smaller carbons, the positive crater becomes smaller but more defined and deeper, while the negative carbon is more pointed and conical. If the carbons are the least bit out of line, the crater will be slightly on one side, and the conical end of the negative carbon will appear unsymmetrical, somewhat as in Fig. 66. C. O. M.

A Brief History of the Mutual Union Company.

If being swallowed means death, then the Mutual Union Telegraph Company is dead; otherwise it may be cast forth again at the end of 999 years, that behemoth of corporations, the Western Union Telegraph Company, having swallowed it for that length of time, by a lease with renewals. Meantime it may not be uninteresting or uninstructive to briefly review the events which have led up to this consummation.

The Mutual Union Telegraph Company was incorporated under the general laws of New York, by the filing of a proper certificate, in October, 1880. In it the capital was stated to be $600,000, with the power of the trustees to increase it to $1,200,000. In February, 1882, the capital was increased by the unanimous consent of the stockholders and officers to $10,000,000, and $5,000,000 six per cent. bonds were issued. This latter action proved to be very important in regard to the subsequent legal troubles of the company, and is the foundation of its principal litigation. It is contended on the part of the company that the increase to $10,000,000 by the stockholders, according to Ch. 319 of the Laws of 1875, was legal, and was not restricted by the terms of the certificate, which only limited the power of the trustees to increase the capital stock, and that Ch. 611 of the Laws of 1872, which applies to all corporations, prohibiting them from increasing their capital beyond the amount specified in the certificate of incorporation, only applied to the trustees, and therefore the present increase of stock is not *ultra vires* but is allowed by the law of 1875, which relates only to the increase of the capital stock of telegraph companies, and is not restricted in any manner. The lines were originally intended only for the purpose of leasing to private parties, but about Nov. 1, 1881, they were opened to the general public for business.

The first suit was commenced by Mr. W. H. Cameron, of Providence, R. I., in the United States Court in New York City, in December, 1881, against the Mutual Union Company, for a discovery and production of certain contracts which had been made with the firm of J. G. Moore & Co. for the delivery of a large quantity of the new stock and bonds of the company for the purpose of further extension of the lines. A demurrer to the complaint was interposed, and it was hung up for awhile, and then discontinued by the plaintiff, who soon commenced another suit in which he claimed upon broader grounds, and more speedy action was desired; hence it was commenced in the New York Supreme Court in March, 1882.

The first legal objection to the increase of stock was by a suit by Mr. Phinney H. Babbitt, also of Providence, R. I., in the New York Superior Court in February, 1882, to restrain the Mutual Union Company from issuing any of its new stock, on the ground that it was without sufficient consideration and was fraudulent. A preliminary injunction was granted, and before its continuance was argued the defendants removed the suit to the United States Court by the filing of an undertaking, and on petition and order made by a judge of the former court.

All these suits were brought in the interest of the Western Union Telegraph Company to prevent competition. A settlement was made under a written agreement by which Mr. Gould and his friends obtained 32,000 shares of stock, and obtained a hold in the Board of Directors. It was supposed by Mr. Gould that the contract was perpetual, as no limitation of time was specified. It was contended by the Mutual Union people that it was only for one year, or the term for which the directors were elected under it, and while Mr. Gould was West, last fall, he hurried home on learning that the stockholders of the Mutual Union Company had pooled their stock, in a combination against his interest and that of the Western Union, for whom he alleged that he held the stock as trustee. He and the Western Union at once commenced a suit, and asked for an injunction to restrain this. A preliminary injunction, during the pendency of the action, was subsequently dissolved by Judge Barrett, in the Supreme Court; that suit stands waiting trial.

In order to further annoy and harass the Mutual Union, an application was made to the Attorney General of New York State, for him to begin an action against the Mutual Union to annul its charter, for the reason that its capital stock had been increased beyond the amount specified in its certificate of corporation, and contrary to the general statute, which prohibits a corporation from increasing its capital beyond the amount. The Attorney General subsequently obtained an *ex parte* order from Judge Truax, in the Superior Court, allowing an action to be commenced by Messrs. Gould and Cameron in the name of the people of the State of New York, for the purpose of having the charter of the Mutual Union annulled, and its property divided among the stockholders, because of its alleged illegal and unauthorized increase of capital. This order was vacated for irregularity by Judge Arnoux and subsequently another application was made in the Supreme Court by the Attorney General in behalf of the same parties, on notice, and this was recently heard by Judge Barrett who has not yet decided the application. The question as to whether the public interest required this action to be prosecuted in the name of the Attorney General was not argued or considered before Judge Barrett, although the Attorney General based his own action in the matter upon that ground.

The suits now pending are: (1) That of Mr. Gould and the Western Union Company to carry out their understanding as to the direction and voice in the control of the Mutual Union. (2) The application of Messrs Gould and Cameron by the Attorney General, to have the charter annulled, (3) The suit of Cameron and Gould in the N. Y. Superior Court, which has been removed to the United States Court, in regard to the increase of capital, and issuing and delivery of the new stocks and bonds, and the contract of the Mutual Union with John G. Moore & Co., for constructing additional lines.

Retaliatory suits and proceedings were instituted by the Mutual Union, but all the suits are now settled, and the terms of the lease are $150,000 per annum upon the stock, whatever the legal amount may be, and six per cent. interest upon the $5,000,000 bonds, with a sinking fund of $50,000 per year for the payment of the bonds or their substitutes. No additional stock has been issued by the Western Union Telegraph Company, as was the case on the consolidation of the American Union and the Atlantic & Pacific, two years ago. The year of jubilee of the Mutual Union, when it will be free from its oppressor, will be A. D. 2882.

The Philadelphia Electrical Exhibition.

The exact time of holding the international electrical exhibition at Philadelphia, under the auspices of the Franklin Institute, to which we referred in our last issue, has not yet been fixed, though many of the managers of the Institute are in favor of holding it in May or June, 1884. The Vienna Electrical Exhibition will occur in August, September and October of the present year, and as it will draw exhibits from all parts of the world, it is thought advisable to allow several months to intervene between the two events. By this means the greater part of the articles exhibited at Vienna would be brought to this country. An extraordinary display is anticipated. It is the intention of the Institute to include all kinds of machinery used in the generation of electricity, as well as all devices to which the current is adapted. In order to promote the objects of the exhibition and encourage foreign inventors and manufacturers to send displays, the aid of Congress has been sought to suspend the tariff laws so far as they would compel the payment of duties on machinery and articles intended for the exhibition.

Does the Electric Light "Freckle"?

Our esteemed contemporary of Philadelphia, the *Times*, has been inquiring about the effects of the electric light upon facial beauty, and, after interviewing professors, shop-girls and policemen, is able to report about as follows:

"Do you see my skin?" said Professor N. H. Edgerton, one of the savants of the Franklin Institute. "Do you observe anything peculiar about my complexion?" he inquired, taking off his white felt hat and showing his long and honorable locks. "Well, I've been sunburnt by electricity. I've had my skin peel right off from exposure to that light over yonder," and he pointed to a very brilliant combination of carbon points hung low down, for the benefit of which a powerful little dynamo-engine was churning out greased lightning. "Of course, such an effect is only produced by near proximity to the light. The spectra of the electric light and of the solar rays are precisely the same, and, although differing in intensity, there can be no difference in the effects. The electric rays falling upon any sensitive surface, whether a lady's complexion or a silk of delicate analine dye, must affect it, especially if the exposure be long continued. But that is not to the detriment of the light. A thin, pale girl, accustomed to working in a close, dark room, will grow ruddy and strong under electric light. Plants thrive under it. For a downright healthy illuminating power give me electricity."

"My sentiments exactly," broke in C. Henry Roney, C. E., M. E., professor of engineering, who is delivering a course of lectures before the Institute, and who happened to be present. "It's not only the chemical effect on the skin, but it's the combustion besides. The paleness of girls by gaslight is largely the result of combustion. The gas eats up the oxygen. The production of carbonic acid gas by an ordinary flat burner is equal to that given off by the breath of five persons, and an Argand burner of eight. Taken on an equality, illuminating gas gives over 10 per cent. of all its combustion in carbonic acid gas, while the electric light does not give one-tenth of one per cent. Then the electric light gives ozone and makes the atmosphere even more healthful than without it."

To these scientific sentiments an experimental electrician a few squares away—Mr. Levy, of the Levytype Company, on Chestnut street—added his practical indorsement. "It is pretty well settled now, I believe," said Mr. Levy, "that freckles are the result of iron in the blood which, affecting the excretions given off in the pores of the face, are turned into discolorations under certain conditions of exposure to light and air. Red-headed girls with iron constitutions have a radical tendency to freckles. The effect of the electric light is exactly the same as sunlight, but I think the constitutional tendency to freckles must exist to begin with. Now, I discovered the most magnificent type of a Saxon girl the other day that you ever laid eyes on. She is the very perfection of fairness, and yet I find that she has been at work all her life in the fields of Saxony. She is at work now under the concentrated glare of numerous powerful electric globes, but I don't think there is serious danger to her beauty. If my theory be right her complexion will stand the test. There is one burner we have that has the concentrated power of two machines. Fifteen inches away its power and effect would be one-third that of sunlight on the same surface, but at fifteen feet you see the power is reduced one hundred and forty-four times. That is the difference. It will require much greater exposure to electric light to tan or freckle. It is illustrated by the difference of the moon's reflected light. I took a girl's picture by moonlight the other night and it took six hours' exposure of a sensitive plate to get an effect that would have been produced under sunlight in the tenth of a second."

Miss Lottie Sawden, one of the floor managers-at-large at Wanamaker's, who has ample opportunity for observing the effect of constellations of the powerful electric lights upon the galaxy of girls who stand in their glare at the counters, declared that she was "familiar, perfectly familiar," with the complexion of every girl in the establishment, every one, and she was "certain, perfectly certain," that there was not a single girl with a single freckle, not one. If there was a girl with a freckle she would know of it. There was a girl who came into the store some time ago who was freckled, dreadfully freckled; but she was at the toilet counter, and in a little while she hadn't a freckle, not one. Miss Sawden said she was satisfied the electric light could never freckle any of the ladies in that establishment. It did not matter what scientific gentlemen said, nor how much any one was freckled in other establishments, or out on Chestnut street, she was sure, perfectly sure, none of Mr. Wanamaker's girls would freckle under any circumstances. No, sir.

Miss Montague, at the perfumery counter, coincided in this opinion and intimated that no really well-informed young ladies ever permitted themselves to freckle now, even in sunlight. Neither of these ladies, however, was able to give any information as to the effect of electric light in changing the color of goods.

Superintendent Pearce, of the Brush Electric Light Works, while unwilling to admit that he had been very much tanned by exposure to the light, said that it was a fact easy of demonstration that the light fades and bleaches goods if they are long exposed to it. "I have seen it turn the color of goods myself," he said, "and there is no doubt whatever about it."

One would naturally suppose that some of the Phœbuses of the law, the city policemen, who stand out the best part of the night under the electric bull's-eyes, would know something about this subject. Nearly all of the reserve squad on night duty along Chestnut street say that the light hurts their eyes.

Officer Reiff, at Broad street, thinks that standing behind the corners in the shadow of the building protects him and he always avoids the corners that have the lamps on.

"Really," exclaimed Officer Emory, stationed in front of the Young Men's Christian Association building, "I never noticed it before, but I guess that's what makes me dark complexioned. It's natural, you know. It's the heat in it that does the business, just the same as the sun. I'm going to look out for it hereafter, you bet. I'm not going to have my complexion spoiled."

Officer Moore, who has an apostolic appearance as he stands on the corner of Thirteenth street, expressed himself vigorously. "I don't like it and never did," he said. "When I am over there under it (pointing with his elbow to the restaurant corner), I shield myself with my cap; when I am over here I stand behind the awning. I don't let it get any nearer to me than I can help."

Officer Newman, stationed in front of the Continental Hotel, is very much tanned, and although he was over six feet before, says he has grown several inches in stature since the electric light was introduced.

Officer Wesley Keyser, for a long time stationed every night under the influence of the Edison light at the *Ledger* building, has developed an extraordinary rosy color, very much resembling sunburn. He has recently been assigned to indoor duty as a turnkey at the Central Station, and much of the ruddy hue has disappeared.

Consolidation Notes.

Mr. G. D. Roberts, vice-president of the Postal Company, says, jubilantly, they are going to put Western Union on the top shelf of bankruptcy.

In Philadelphia the merger is particularly unlawful, as it violates an ordinance which was approved March 25, 1881. This law permitted the Mutual Union Telegraph Company to belt the city with a sinuous line of poles and wires beginning at the Fox Chase on the northern boundary and leaving the city at Baltimore avenue and the county line on the south. The Mutual Union Company, in consideration of this privilege, was required to "give its bond in the sum of $20,000, with the condition that it will not consolidate with any other telegraph company owning a competing line, or acquire by purchase or otherwise any such competing line of telegraph; provided, further, that in case of such consolidation, merger or sale, the poles, wires and fixtures erected shall become the property of the city of Philadelphia, and the said bond shall prescribe these conditions."

It is suggested that the Mutual Union in executing the lease has agreed to a contract which it cannot carry out. In the State of Pennsylvania, for instance, it is claimed that it forfeits all its franchises by the very execution of the lease. Attention is called to the fact that article 16, section 12, of the Constitution of Pennsylvania reads that "No telegraph company shall consolidate with or hold a controlling interest in the stock or bonds of any other telegraph company owning a competing line, or acquire by purchase or otherwise another competing line of telegraph." It is generally known that the Attorney General of Pennsylvania has brought suit against the Western Union Company in the name of the Commonwealth and for a violation, not of a statutory enactment, but of the Constitution itself.

A director of the Western Union says that the business of the Mutual Union will be carried on in the present quarters in this city until May 1, when the lease will expire, and then, it is expected, everything will be transferred to the Western Union building.

An order signed by President John G. Moore notified all Mutual Union employés that their services would not be needed after the 1st proximo. One of the operators in this city, on hearing the sad news, dashed off the following pathetic impromptu:

What on earth will be our fate,
Now the M. U. is no more?
Strange thoughts are whirling through my pate,
Making my head feel awful sore;
Indeed, I feel quite desolate.
O where can I borrow a dollar or more?

A subsequent circular, however, signed by Superintendent A. S. Brown, modified, if it did not neutralize, this order, and there is some doubt as to what will be done. The fact is, we believe, that anything like a sweeping reduction of force is impracticable, since the growing business demands prompt attention, and the increased mileage of wire will require the entire force now employed.

At a meeting of the Executive Committee of the Board of Trade, held in this city on the 14th inst., the new consolidation was roundly denounced, and it was resolved that: "We call upon Attorney General Russell to thwart these schemes by a vigorous personal prosecution of the suits which have been begun in his name and by his authority to annul the violated charters of these telegraph corporations."

Any one who has kept track of the doings of the Mutual Union could have seen that it was not at all times in earnest. We have endeavored to explain its peculiar workings to our readers, but have never been able to put the case as neatly as it was done last week in the resolutions adopted by the Executive Committee of the Board of Trade in this city. They said: "This company was started on a basis of $600,000 capital, which was almost immediately increased to $10,000,000 without consideration, and, as it appears from proceedings in court by a stockholder, the directors made a contract with a credit mobilier construction firm in which they were interested by which $4,000,000 in bonds and about $10,000,000 in stock were guaranteed for constructing lines and plant valued at $3,000,000, and, naturally, things being developed thus far, negotiations were opened with the controlling spirits in the Western Union Company for another consolidation and stock watering, but owing to a 'falling out' as to the terms of the 'divide' and as to who should control, this has not yet been consummated, and legal proceedings were begun which developed these very interesting facts." Since then the "falling out" has been adjusted and the "divide" has been agreed upon.

At a meeting of the directors of the Western Union Telegraph Company, held at noon on Monday, President Green made a report that the company had taken full possession of the Mutual Union's wires under the lease made a week ago. There was a formal ratification of the lease. Dr. Green says: "The rumor that has been circulated that we have failed to carry the lease into effect is entirely without foundation—in fact, I say positively that we have now fully accomplished the bargain with Mutual Union, and there is no legal proceeding that can render the lease null and void."

The Telephone in Toronto.

The telephone system of Canada is wholly operated by the Bell Telephone Company of Canada, whose lines extend all over the Dominion, from Halifax to Vancouver's Island. The company was established in Toronto about four years ago. Very little real progress, however, was made till about a year and a half ago, when the Bell Company succeeded in buying up the interests of the Toronto Telephone Dispatch Co. This circuit consists of Toronto, Yorkville, Hamilton, Waterdown, Dundas, Guelph, Galt, Hespeler, Palermo, Whitby, Oshawa, Bowmanville, Port Hope, Newcastle, Springfield and Cobourg. The connecting wires from Toronto to all these points have been put up during the past year, with the exception of the line to Hamilton, which was constructed about eighteen months ago. In Toronto during this time the business has just about doubled itself. At present there are some 600 sets of instruments in use, of which 520 are connected with the exchange, the remainder being on private lines. All this requires upwards of 500 miles of wire. The difficulty has been to keep pace with the demands of new subscribers, and some have been kept waiting for their instruments. This delay has been caused by the enormous demand all over the Dominion. The instruments are now being manufactured in Montreal in sufficient quantities to supply the demand. For communications between Toronto and any other city or town on the circuit, a uniform charge of one cent per word is made. This gives a rate much lower than the telegraph lines, but it is said that it does not at all interfere with the extent of the latter's business.

The following table is given of the business done at the principal agencies of the Bell Telephone Company of Canada:

Instruments in use.		Instruments in use.	
Montreal has about	866	Winnipeg has about	250
Toronto "	600	Quebec "	240
Hamilton "	320	London "	230
Ottawa "	250	Halifax "	170
St. John, N.B. "	375	Victoria, B.C. "	130

A Telegraph Operator Murdered.

A special dispatch dated Laredo, Texas, Feb. 15, says: "William Monroe, station agent and operator at Webb station on the International & Great Northern Railroad, thirty miles from Laredo, was murdered last night. On the arrival of the passenger train toward San Antonio at that place, he was found with a gun-shot wound through his head. He was still alive and was taken to San Antonio, but soon expired on reaching there. An unfinished letter was found on his table to his mother, stating he would be home in July. It was thought he was murdered for what little money he had. His trunk was found a few hundred yards from his office broken open, containing nothing of value. Marshal Gosling and a deputy sheriff with a posse left to-night on a special train and will start from Webb, where the rangers will meet them, and scour the country for the perpetrator of the bloody deed. No clue."

Commenting on the above, a correspondent writes: "It will convey an idea of the realities of western Texas, and will, it is to be hoped, tend to quell in some degree the burning desire operators so firmly cherish of laying aside the charms of comfort and civilization to plant their destinies in the wild and bloody fields of that detestable West."

THE OPERATOR

AND

ELECTRICAL WORLD,

PUBLISHED WEEKLY AT

No. 9 MURRAY STREET, NEW YORK.

W. J. JOHNSTON, Editor and Publisher.

NEW YORK, FEBRUARY 24, 1883.

CONTENTS.

PAGE.

ILLUSTRATED ARTICLES:
Electric Lighting—XVII....113

POETRY:
A Cruel Deed....113

EDITORIAL:
Telegraphic Competition....116

MISCELLANEOUS:
A Brief History of the Mutual Union Company....114
The Philadelphia Electrical Exhibition....114
Does the Electric Light Freckle?....115
Consolidation Notes....115
The Telephone in Toronto....115
A Telegraph Operator Murdered....115
Pneumatic Tubes instead of Underground Wires....117
The Morse Code at Sea....117
Canadian Notes....117
The New England Telephone Companies....117
Our Electric Light Companies....117
On the Transformation of Static Electricity into Voltaic Currents....118
Filing an Application....118
Telephoning to Ireland....118
Electric Light for the Brooklyn Bridge....118
Binders for THE OPERATOR AND ELECTRICAL WORLD....118

COMMUNICATIONS:
Incandescent Electric Lights....119
Sounds in Telegraph Relays....119

DEPARTMENTS:
The Electric Light....119
Telephone Department....119
Dashes Here and There....119
New York City Items....120
Personal....120
Births....120
Marriages....120
Electrical Patents Issued....120
Business Notices....120

NEW ADVERTISEMENTS.

PAGE.

APPLEGATE ELECTRIC ALARM MATTING CO.—Invisible Electric Matting Alarms....124
THE UNITED STATES ELECTRIC LIGHTING CO.—Arc and Incandescent Lighting Apparatus....128
VERNON & CO.—Easter Cards....128
PROF. OTTO MAURER.—Fine Magical Apparatus....128
J. H. COBB & CO.—Operators Read! Agents Wanted....128

TELEGRAPHIC COMPETITION.

Now that the Western Union has agreed to pay $500,000 per annum, and virtually increased the basis of its own capital to $100,000,000, to absorb the Mutual Union, it becomes interesting, in view of the restless activity of speculators and the rich harvests gathered by these temporary opposition lines, to inquire how long the Western Union can keep up the process of buying them out.

An increase in its capital stock in two years from $41,000,000 to $95,000,000 has certainly not removed any of its difficulties, since the Baltimore & Ohio, the American Rapid, the Postal and the Bankers' & Merchants' will soon afford abundant facilities for public traffic, and will receive more encouragement from the public since their existence has become essential to a free competition in telegraphy.

The closing of a Mutual Union office here and there will, of course, in a limited way, decrease the public accommodation, and so not only call for public censure in such instances, but also leave an eligible site for a telegraph office for the next company that may choose to rent it.

The only true and lasting way to compete in the telegraphic field is by rendering a better service than any one else for the money; and, with the admirable wire facilities of the Western Union, the acknowledged ability of its management, its improved apparatus, the vast extent of territory covered, and the splendid operating force in its employ, we are surprised that this fact has not been recognized long ago.

By hiring the best operators and paying them the best wages, by building and maintaining the best lines, and giving the public prompt and reliable service at reasonable paying rates throughout its vast system, the Western Union is fully competent to compete with any opposition, however strong it may become; and we believe that instead of buying out such happy-go-lucky concerns as are put up for sale nowadays, the Western Union would, by the overshadowing magnitude and thoroughness of its work, profit rather than lose by allowing them to remain in the field as a contrast,

---

THE closing up of the Mutual Union will be a serious embarrassment to a number of worthy operators; but they may find some comfort in the reflection that the consolidation will only stimulate the building of new rival lines and the rapid extension of those already in operation. The Baltimore & Ohio, extending over a vast system of railroads, with ten wires to Baltimore, seven thence to Chicago and five to Cincinnati, as well as four more from this city to St. Louis, has a splendid groundwork for a vigorous opposition. The American Rapid, with already 11,000 miles of line, is receiving all the public patronage it can handle. The Bankers' and Merchants', with eight wires to Philadelphia and four to Washington, is so hard pressed as to be compelled to refuse general and press messages during the day. The vanguard of the Postal line has reached a point within 200 miles of Chicago. In the South, the Southern Telegraph Company, which was organized under the laws of this State a year ago with a capital of $5,000,000, has completed lines from Washington to Richmond, Norfolk and Lynchburg, and, according to one of its directors, expects to have its lines completed between Washington and New Orleans by Sept. 1, 1883. The lines from the present northerly termini are being constructed, and construction from New Orleans north will be begun in March. The system is to consist of two lines of four wires each, one from Washington by way of Lynchburg, Augusta, Atlanta, Selma and Montgomery, and the other by way of Norfolk, Wilmington, Charleston, Savannah, Macon, and Mobile. The recent consolidation has given a tremendous impetus to these organizations, and each one seems disposed to take the tide at the flood. This is a better prospect for the operators than was presented after the collapse of the late American Union, and if any one who is able and willing to work shall not be comfortably placed within the next few weeks it will be because he has not read THE OPERATOR AND ELECTRICAL WORLD assiduously, and has thus failed to grow up with the business.

SINCE our last issue Gen. Hazen has gone into the letter writing business rather extensively, and has been sharply rebuked in return by Secretary Lincoln. The length of the correspondence, and the effusions of Messrs. Clapp, Powell and Swift, would seem to indicate that "a wind centre" is now prevalent over Washington. Gen. Hazen has made the mistake sometimes made by over-zealous telegraphic officials, of refusing to listen to the just appeals of an humble subordinate. Fifteen months ago a Signal Service employé made an exposé in this journal of the tyranny of that department, one of his illustrations being that a pompous young officer compelled an enlisted telegraphist to hold his horse while the officer in question paraded around with his female friends. Nothing was done then to allay the discontent, but, on the contrary, Gen. Hazen fell upon one of the sergeants, whom he has since striven to snuff out with the stigma of "discharged and degraded employé." It is not necessary to say that he caught a tartar, and that he is now having about as lively a time with the Signal Service as the late loquacious Le Duc had with his Agricultural Department. A man is never so high up in life that he can wrong or ignore the just claims of the meanest subordinate with impunity, and that kind of a "discharged and degraded employé" is sure to return sooner or later to mock him in his hour of tribulation.

THE series of terrific storms of last week, with floods and washouts extending over two-thirds of the continent, put the telegraph lines to a severe test; but the manner in which communication was maintained is highly creditable to the efficiency of the entire telegraphic working force. On the 16th inst. the deluge extended from Buffalo to Omaha, and from St. Paul to Cairo, and, although the demoralization was at one time nearly complete, there was comparatively little delay to the public business. Fifteen years ago such a combination of floods, cyclones and blizzards would have interrupted the telegraphic service for weeks, but now, if there should be any suspension at all during a heavy storm, it is certain to be "O. K." with the first peep of sunshine, and the wires will be "quadded" at that. This is good service all around—good management, good lines and good operators—and any new competing organization will have to touch that standard before it can hope for success.

WITH the merging of the Mutual Union Telegraph Company into the Western Union, it is to be feared that all hope of unraveling the mysteries connected with the former company—at least so far as the public is concerned—is at an end. The questions of who got the $250 that Secretary Peck of the Mutual Union asserted had been paid by Western Union officials to bribe a Mutual Union clerk, and of the contents of the eleven mysterious boxes that Mr. Jay Gould was so anxious to get hold of, will probably have to be relegated to the realm of the unknowable, along with the identity of the man in the iron mask, of the person who struck Mr. William Patterson and of the individual who got the whiskey-skin at Gilgal. The eleven boxes have been withdrawn from the place where they were stored, and Mr. Gould's suit for possession of them has been discontinued.

THE frequency with which promising and so-called opposition lines are absorbed by the Western Union leaves room for the suspicion that the speculators take advantage of the popular cry for competition, build a five-million-dollar line, reap the benefit of an inside construction company, and then bide their opportunity to sell out for fifteen millions or so. It is as good as an old time maxim to assert that no speculator in any business cares a cent's worth for the public interest, and the style of opposition shown by the Mutual Union gives plausibility to this assertion. It pays, however, and now that the Western Union is advertising to buy any such watered concern that may come along, there will be a great stimulus given to "opposition" lines.

THE consolidation of the Western Union and Mutual Union companies will put an end to a good deal of tedious litigation. Much of this has been factious opposition, and the law courts have, we believe, in their anxiety to protect the people against the evils of monopoly, done much to prevent the development and free use of the telegraph. The various companies, whether swallowing each other up in monopolizing gulps, or ruining each other by the worst kind of competition, can get along better without introducing legal complications, and by being governed entirely by the laws of trade. Monopolies may be formed, but they carry with them their own disintegrating influences.

EUROPEAN countries have been slow to award to Prof. Morse the honor which we have been wont to claim for him, as the inventor of the telegraph. The steps now being taken in Italy in that direction are, therefore, all the more gratifying. The municipality of Rome has recently placed in the house occupied by Prof. Morse in that city in 1830 the memorial tablet to which reference was made in these columns in last September, and the Syndic has informed the American Minister that the unveiling of the tablet will be deferred until the wishes of the American colony in regard to the ceremony are made known.

MR. G. D. ROBERTS, vice president of the new Postal Telegraph Company, says that with the compound wire of steel and copper, used by his company, long-distance telephony will be much simplified. The conductivity of such wire and its complete insulation, he says, will enable persons to talk between New York and Chicago as readily as others do now between New York and Brooklyn. He claims that the resistance in 400 miles is only 179 ohms, as against 1,700 ohms in the old lines. Mr. Roberts should now tell us by what means retardation will be overcome—a factor in long-distance telephony which we fear he has overlooked.

WE publish to-day a sketch of an interesting article upon the mooted question of the influence of the electric light upon those who constantly work under its rays. The article seems to show that the electric light will tan the skin in a manner similar to the sun, though in a lesser degree; but, while begging the six-foot Philadelphia policeman's pardon, we must discredit his assertion that he has not only been "sun-burnt," but has grown several inches in stature since he stood nightly under the electric light.

THE main argument of telegraph companies as an excuse for amalgamating is always the same—economy. This means closing up duplicate offices in many towns, and reducing the working staff in other places, thus throwing hundreds of clerks and operators out of employment. The present time is, however, very favorable to the employés for such an overturning, since with the opening of what promises to be a brisk spring trade, and, subsequently, the usual summer offices, there will be work enough for all.

WHEN Jay Gould brought suit for the forfeiture of the Mutual Union charter, his counsel claimed that its stock was largely fraudulent or unlawful; yet the Western Union has just paid fifteen millions for it. Mr. Keene is now wondering about how much the Postal line may be worth, especially after he shall have made its nominal capital about three times as great as it ought to be.

SOME time ago the Attorney General of this State, with the connivance probably of the Western Union Company, brought suit for the annulment of the Mutual Union charter, on the ground of fraud. To annul that charter now would be to relieve the Western Union from the necessity of paying the half a million dollars per year agreed upon in the lease of the Mutual Union system.

A CORRESPONDENT in last week's issue wanted to know how many operators there are in the United States and

Canada. A tedious search through the Tenth Census Report gives us 22,859 "officials and employés of telegraph companies in the United States;" which, of course, does not include those in the Dominion of Canada, and those in the United States engaged in other business.

Pneumatic Tubes Instead of Underground Wires.

Instead of placing a portion of its wires in New York underground, as was recently announced, the Western Union Telegraph Company has determined to increase its pneumatic tube service, the first step toward this end being the lease of a large building on the corner of Fifth avenue and Twenty-third street.

A few years ago Gen. T. T. Eckert, vice president and general manager of the company, made a study of the pneumatic tube system of London, and became convinced that it was practicable in this city. The first experiment was made by connecting the Stock and Cotton Exchanges with the main offices by pneumatic tubes. The result was exceedingly satisfactory to both the company and its patrons. The service was performed more quickly, greater accuracy was secured by avoiding retransmissions, and expenses were diminished. The next step was to connect the main office of the company with the offices of the newspapers belonging to the Associated Press. The company now proposes to increase its pneumatic tube service, and partly to that end has leased the building mentioned.

Extensive alterations are to be made in it, not only for the Western Union but for its auxiliary companies, the American District and the Gold and Stock telegraph companies. Within six months the pneumatic tubes are to be laid between the new up-town headquarters and the main offices at Dey street. They are to be three inches in diameter, so that the boxes used will carry a large batch of dispatches. One tube will be used for distributing and one for collecting messages. It is expected that about two minutes will be required for a box or cartridge to travel from one office to the other. Both pressure and exhaustion will be used to force the boxes through the tubes, and powerful engines and the requisite machinery will be put in the up-town office. The new office will be the distributing and general receiving office for all of the city above Fourteenth street. It is understood that the plan contemplates ultimately the connection of the busiest of the up-town branch offices with the one at Twenty-third street by pneumatic tubes, and that if it is practicable a tube will be laid connecting the intermediate offices between Twenty-third street and the main office with both. With the pneumatic system now in use down town a very large part of the local telegraphic service of the city would be done by means of the tubes. Many of the wires could then be dispensed with.

The Morse Code at Sea.

Apropos of the recent terrible loss of the steamer Cimbria by collision in a fog, and the need of an improved method of signaling at sea, the New York *Herald* revives an old idea—one that is almost as old as telegraphy itself—the idea of conveying signals to a distance by means of long and short blasts of a steam whistle, representing the characters of the Morse code.

"I've thought of this matter for years," said an old sea captain to the *Herald* reporter, "and I don't think anything better could be done than to demand an international system of steam-whistle signaling. Had such a system been in existence the Cimbria catastrophe would not have been excusable, and I don't know how many human lives would have been saved."

Here the captain approached a small telegraph machine and touched the key.

"You see," he said, "I can send messages by a short and a long touch, or a combination of short and long touches. Why shouldn't the same thing be done by steam? Let sea captains learn the value of the dot and the dash and apply the system to steam whistling, and in foggy weather passengers will have comparative safety. The letter N, representing "north," would be indicated by a dash and a dot, as a long whistle and a short whistle. The letter S, meaning "south," would be indicated by three short dots, or three short whistles. The letter E, meaning "east," would be indicated by one single quick whistle. The west would be indicated by a dot and two dashes—that is, one short whistle and two prolonged whistles. On the same principle all the points of the compass could be easily indicated, so that vessels in a dense fog could communicate with each other easily and distinctly. Two captains at a distance might even tell a story through the fog, or invite each other to take a drink. The dot would be indicated by one single short and sharp toot from the whistle, and of course the dash would be represented by a prolonged whistle. The United States Government has already published some rules under which our ferry and river boats travel. By one whistle a boat tells another that it is traveling to the right. By two whistles it indicates that it is going to the left. This same idea has only to be elaborated on the Morse system and vessels could communicate with each other on the high seas no matter what the condition of the weather might be.

"Why," continued the Captain, "two expert telegraph operators can take opposite locomotives and talk to each other with the greatest ease, and I don't see why sea captains should not be able to do the same thing. Out in the West, some years ago, a frame bridge broke down over a great river, and from shore to shore there was no means of communication. Well, somebody thought of getting two telegraph experts together. One mounted a locomotive on one side of the river, the other took charge of a locomotive on the opposite bank. By working the steam valve and putting the whistle in play they managed to send messages to each other, and the bridge was speedily reconstructed, mainly through this ingenious application of the locomotive whistle. I've got another idea. Why shouldn't people at sea when they are visible to each other in clear weather talk to each other by streaks of steam in circumstances where the sound of a whistle could not reach? A short puff of steam would be equivalent to a dot in the Morse system, and a long streak would be equivalent to a dash. By using the steam jets on a fixed scientific principle two captains watching each other through binoculars from a long distance could communicate with each other easily."

"But mightn't the wind interfere?"

"Practically, I don't believe it would. A man with good glasses could tell at a distance and instantly whether the jet of steam as it issued from the pipe was a long or a short one, even though it might be afterward dispersed by the wind. Here, upon the Morse system, would be a steam indication of the cardinal points of the compass. The long streaks would represent dashes and the short ones dots:—

North.	East.	West.	South.
— —	—	— —	— — —

"If this scheme were adopted one international system would have to be agreed upon. The French, for instance, spell west 'ouest.' I fancy, however, that English would be the language adopted internationally; and, in my opinion, as the suggestion of steam jet communication is wholly American, the United States Government ought to take a strong initiative in calling for an improvement of the steering regulations that now exist upon the great Atlantic highway."

Canadian Notes.

The Canada Mutual Telegraph Company has opened an office at Lachine, Quebec.

The Dakers-MacDonald controversy has finally died out, to the relief of the public.

Mr. F. N. Gisborne, superintendent of the Government telegraphs, has patented a new telegraph wire, which he claims to be superior to any now in use.

Up to the 6th inst. Mr. F. H. Ennis, secretary of the Public Works Department, had received tenders for the supply of 5,500 telegraph poles, to be used on the coast between Point des Monts and Pentecost River.

The absorption of the Mutual Union Telegraph Company by the Western Union has caused considerable discussion in the Dominion as to its effect upon the Canada Mutual Company and the proposed Anglo-Canadian Cable Company. The general opinion is that the former company will be absorbed by the Great Northwestern.

Here is a chance for some of our live and enterprising electric light companies. The contract between the gas company and the corporation of Ottawa for the lighting of the street lamps, which has been in existence for five years past, expired last month. The company has not given the satisfaction that would warrant the corporation renewing on the same terms. The Fire and Light Committee is considering the advisability of lighting the streets with naphtha.

The authorities at Ottawa have been written to from Castle Grove, County Galway, Ireland, by Mr. Samuel McDowell, of that place, for any tidings of his daughter, Mary Jane McDowell, telegraph operator, who would appear to have been in Quebec on the 14th of July last, by a letter bearing that date and addressed by her from that place to her father. She spoke in it of having been very sick on the passage out, but said she was better and hoped to be soon settled. Since that date nothing whatever has been heard from her.

The Canadian Government telegraph service in the Northwest is being gradually extended, and in the course of a few months all the central places in that country will have communication by telegraph with the outside world. The poles are being erected from the railway to thirty or forty miles west of Touchwood. Mr. H. Gisborne, the district superintendent, has procured the wire and instruments from Winnipeg. The line to Touchwood will be in working order, it is expected, before the end of the present month. The Government has fixed the tariff, which is very reasonable, and it is hoped the service will be of great benefit.

A line of the Dominion Government telegraph will be established from where the present line crosses the south branch of the Saskatchewan to Prince Albert, N. W. T., with stations at the crossing, St. Laurent and Prince Albert, provided the people thereabouts will lay the necessary poles on the ground. At present the Prince Albert district will have a special telegraph service until the missing link is constructed. Dispatches are at present being received at Touchwood Hills, from the east, and from the west at Humboldt, and exchanged between those points once a week. The people have agreed to lay poles on the ground, and at the coming session of Parliament a grant will be asked for the work.

Mrs. A. R. Bethune has petitioned the Superior Court of Montreal to appoint a curator to look after her husband and his property, which she alleges he is incapacitated by bad habits from doing. Mr. Bethune was, years ago, an operator in the Montreal Telegraph Company's office at Montreal. He will contest the petition.

The New England Telephone Companies.

The annual meeting of the National Bell Telephone Company of Maine was held at Lowell, Mass., last week. The report of the treasurer showed that the company had connected Jan. 1, 1883, 3,708 subscribers, a net increase of 803 made during the year 1882.

The subscribers are distributed as follows:

Augusta	172	Lewiston	230
Bath	103	Lowell	950
Bangor	220	Portland	710
Biddeford	67	Rockland	42
Boothbay	20	Waterville	40
Calais	54	Worcester	826
Fitchburg	260		

The company has a total of 2,243 miles of wire. The net earnings for the year were $86,931.96, of which $59,298 has been paid out in dividends, leaving a surplus of $27,633.96, which added to surplus on hand Jan. 1, 1882, $9,710, makes a surplus to date of $37,343.96. It is predicted that the increase of 1883 will exceed that of 1882. The following officers were elected for the ensuing year: W. A. Ingham, president; Chas. J. Glidden, treasurer and secretary; Loren N. Downs, general manager, Lowell; Franklin J. Rollins, clerk, Portland, Me.

During the month of January the telephone companies handled 21,158 extra territorial messages, as follows: Union, 1,144; National Bell of Maine, 1,850; Bay State, 7,333; Boston and Northern, 10,831.

The Boston & Northern Telephone Company is making arrangements for an extensive development of its vast territory the coming season. It is intended to duplicate many extra territorial lines already built, and to build wires connecting all the principal points in northern New Hampshire and Vermont. In the latter State at present no lines of this kind are in operation, and the demand for these facilities warrants their being constructed at once. Arrangements are nearly completed for the acquirement of several large exchanges not already owned by this company; also for the establishing of new exchanges in territory never before operated. Claremont, N. H., and St. Johnsbury, Vt., will be among the number. The White Mountain service is to be improved by the building of a new line from North Conway through the notch, Ammonoosuc and Franconia valleys, the ultimate intention being to connect directly with Littleton and St. Johnsbury. This company will stretch 1,000 miles of new wire during the spring and summer.

A rumor of important movements discussed at the meeting of the Maine company caused a marked advance in the stock of the Boston & Northern.

During January 600 telephones were put in service in the Northern, Bay State and other districts controlled by the Lowell board of management. The monthly average heretofore has been from 400 to 500, and the increased demand is becoming too great for the present supply.

The National Bell Telephone Company, of Maine, is building a line from Bangor to Bucksport, which, by June 1, will be completed through Ellsworth to Bar Harbor. It is expected, next summer, to furnish good results by direct telephoning between Boston and Mt. Desert, although the distance is more than 300 miles.

Applications have been made for more than 200 summer stations from Revere Beach along the North Shore, and South Shore communication is largely to be increased.

The Western Massachusetts Telephone Company is building a line from Springfield, through Great Barrington and Stockbridge to Pittsfield. At Pittsfield connection will be made to North Adams and Troy.

Our Electric Light Companies.

The Edison Electric Light Company, the parent and pioneer in the field of incandescent lighting, has a capital of $720,000. When its capital was only $300,000 its $100 shares sold as high as $3,700. Three shares were sold at that price, and their purchaser is reported to have sold them at private sale on the same day at $5,000 a share.

The capital of the Edison Illuminating Company is $1,000,000, and the par value of its shares is $100. It has sold as high as $125 and as low as $80 a share. $85 is now bid for it.

The Edison Company for Isolated Lighting—the only Edison company that has paid a dividend—has a capital of $1,000,000. The par value of its shares is $100, and they have sold as high as $240 They are now offered at $155 with $140 bid.

The Edison Electric Light Company of Europe has a capital of $2,000,000, and the par value of its shares is $100. It has a monopoly of the Edison system in Europe. Its stock sold soon after it came on the market at $165 a share, and has declined to $40. The present quotation is $40 bid, $55 asked.

The capital of the United States Electric Lighting Company is $1,500,000. Its shares, of the par value of $100 each, sold about three years ago at $300 per share. During the extreme depression in this class of stocks about six or seven months ago its stock sold at $82.50 a share. The

last reported sale was at $125, and at present $130 is bid and $150 asked.

The patents of the United States Company are used extensively in this city by the United States Illuminating Company, which has a capital of $1,000,000, only one-half of which has been issued. The transactions in its stock have not been large. The last was at $103 per share.

The Brush Electric Company of Cleveland has a capital of $1,000,000 in $100 shares. The stock sold recently at $110, and it is said that it can be bought at that price now. The present bid price is $100. It has never sold below its par value.

The Brush Illuminating Company of New York has a capital of $1,000,000, and the $100 shares have sold as high as $125, and about three months ago had dropped to $70. The current quotation is $100 bid and $110 asked.

The Brush Illuminating Company of New York owns most of the stock of the Brush Electric Light Company of New England, which uses the Brush system throughout the Eastern States. This stock is not dealt in, but is supposed to be worth about $500 or more a share.

The Fuller Electrical Company manufactures electrical machines. It has a capital of $870,000, of which $300,000 is common stock and $570,000 preferred. The par value of both classes is $100. The common stock has sold from $32 to $22 a share, and the preferred from $61 to $75 a share. Present quotations are $33 bid for the common, and $75 bid and $100 asked for the preferred.

The American Electric Light Company has been distinguished chiefly for the counter charges of fraud that some of its officers exchanged a few months ago. The company has a capital of $500,000 in $50 shares. Some of these shares have sold at $35. They are now offering at $4.75.

The Brush-Swan Electric Light Company is the last organized enterprise of this class. It combines all the Brush and Swan inventions, and uses electricity generated by the Brush process in the Swan incandescent lamp. The capital of the company is $600,000, and the par value of its shares is $100. Sales have been made at $150 a share, and it is now quoted at $105, and $150 is asked.

On the Transformation of Static Electricity into Voltaic Currents.

A voltaic current thrown into any given conductor determines by induction a counter current into a closed circuit which is adjacent and parallel. If we remove the inducing current, we obtain in the same circuit a current opposite in direction to the first. If the resistance of the induced current is great enough, the two currents thus produced take the character of tension electricity, and may reproduce the effects of ordinary electric machines. This is the theory of the Ruhmkorff coil.

It was therefore natural to ask if the system is not reversible, and if, in other words, on passing the discharge of an ordinary electric machine into the fine wire of a coil, we might not obtain in the thick wire an induced current of a very feeble tension and analogous to voltaic currents.

It was only in 1875 that Bichet made his first experiments. With a Holtz machine and a Ruhmkorff coil he was able to decompose water, and to deflect permanently the needles of a galvanometer. He stopped here, and whether he did not seize the full importance of his discovery, or that other more pressing researches drew off his attention, he did not occupy himself with them further. Professor Goir also sought to transform static electricity into a voltaic current. The announcement of the discovery of the French *savant* caused him to suspend his labors, but he resumed them when he saw that Bichet had laid the question aside.

For the success of the experiment the electrical discharges must be rather strong. Without this condition (which is easily realized by the aid of condensers) the effects of the induced current will be too feeble to be easily observed. Another condition is that the interval between the inducing sparks must not be too great, so that the current may not lose the quasi-continuity which approximates it to voltaic currents.

This current, further, has a character by which it can be readily distinguished. Instead of being truly single and continuous, it is double and discontinuous. When the spark passes into the thick wire, it determines an induced current in one direction, and, immediately after the passage of the spark, another current in the inverse direction, but the rapidity of the electric discharge is such that practically these two currents only form one. Another cause of discontinuity is the discontinuity of the inducing sparks. With the exception of these two characters, the current behaves in all respects like the currents produced by batteries with liquids.

Its tension is at first very feeble, since it does not give a spark, even on the slightest interruption of the circuit. If the current is put into the acidulated water of a voltameter, we obtain decomposition, and, under each receiver, we find a certain quantity of gas. As the current is continually inverted, the gas is a mixture of oxygen and hydrogen, the proportions of which vary in each experiment. Perhaps, by suitably regulating the resistance in the induced circuit, we might find the means of eliminating one of the two simultaneous currents, and of thus separating one or other of the gases. If a galvanometer is interposed in the circuit, the needle is not sensibly deflected so long as the circuit does not present a special resistance; but, if we interpolate an interrupter (*e. g.*, Froment's vibrating reed), the needle is suddenly deflected, and this deviation is considerable enough to give a hope of the possibility of utilizing the induced current.

If we cause one of the rheophores to communicate with a file and run the other over the teeth of the file, we have a train of reddish-yellow light like that which we obtain on repeating the experiment with the wet battery. This phenomenon is not that of the spark. It is due to particles of iron and carbon which are detached from the file under the action of the current, become fused or volatilized, and establish thus a kind of bridge between the teeth of the file over which the rheophore is passed.

The two rheophores terminating in very fine carbon points prepared for the voltaic arc are brought in contact. On separating them carefully we see at once a jet of electric light analogous to that furnished by the Gramme machine or the batteries. On repeating the experiment with a conduction wire and a mercurial bath, we obtained a luminous arc due to the incandescence of the mercurial vapors. This arc is less bright, but more durable.

This induced current on circulating around a cylinder of soft iron produces rapid magnetizations in two opposite directions, which may be shown either by the magnetic spectra obtained with iron filings or by the vibrations of a very light and mobile plate of iron.

Lastly—the most curious experiment of all—the induced current produced in a Ruhmkorff coil by electric discharges may be directed into a second coil like the current of a battery, and determine long sparks with which all the phenomena of the Ruhmkorff coil may be repeated.

Thus the result is a transformation of static electricity into a dynamic current. If with the small Holtz machine which served him as a current-exciter, M. Goir has been able to decompose water, to ignite a bad conductor, and to produce the voltaic arc, we may hope by improving the apparatus to obtain powerful electric currents with the machines which produce static electricity, and that with a much less expenditure of force. Perhaps by multiplying, or better insulating, the discharges of atmospheric electricity, we may render ourselves masters of this agent, equally capricious and menacing, and turn it to domestic purposes—*Les Mondes.*

Filing an Application.

(From "Jumbo's Jolly Jokes.")

[SCENE.—*The office of the Genial Superintendent—Mr. Sellem. Enter an applicant—young Mr. Rushem.*]

"Good morning, Mr. Sellem."

"Ah, good morning, my young friend."

"Mr. Sellem, did you file my application I made to you for a position some time ago?"

"Well—yes—that is, I instructed my clerk to file it, and I presume it's all filed down by this time to the proper shape."

Calls to his clerk: "Say, Filer."

"Sir."

"Have you succeeded in filing this gentleman's application yet?"

"Almost," he answered. "I made out all right till I came to the salary item, and I broke a couple of files over that. It was hard to file down. But I expect to get it done by this time next year. If not, I think I will try a couple of two feet rasps on it, and that'll fetch it, you bet."

"You hear," says Mr. Sellem, turning to his youthful applicant, "what my clerk says. I assure you that he is without a peer in his position as head filer. Your application will get the best possible treatment from him. He has lots of this business to do, and uses up thousands of files every year. In fact, the bill for files and rasps costs the company quite a snug sum annually. I would suggest, my young aspirant, that next time you bring along the necessary implements. Good-morning, sir."

But he never returned the salutation, for seeing he was sold, he hurried down stairs, got out of the building, shook his fist at the imposing structure, muttered something, and walked off.

Telephoning to Ireland.

The St. Louis *Post-Dispatch* is responsible for the following telephone story: During the dull hours of noonday the Broadway horse dealers while away the time by practical joking. Yesterday one of the funniest jokes was perpetrated on an unsuspecting Irishman who sauntered into John P. Mullally's stable. After a desultory talk, he was drawn into giving a history of himself. He said he was from the McNeals, of Ballyjamesduff, County Cavan, Ireland, and his daughter Kate and brother Jerry lived on the land that he first saw the light on. Toby Mealin rented the land adjoining his, and lived there with his wife, son and daughter. He gave many other facts about his family. A few moments later Mr. Mullally withdrew and went to Tom Maxwell's stable. McNeal was asked if he wouldn't like to hear from Ireland by telephone. He was delighted with the prospect, and put his ear to the trumpet, asking: "Who's there?"

From Maxwell's stable, which in the meantime had been connected with Mullally's, Mr. Mullally replied with a voice as nearly approaching a feminine note as he could, "This is Kate McNeal, Ballyjamesduff, Ireland."

"Meella murdher," exclaimed Mike, dropping the trumpet and clasping his hands in surprise, "I recognize her vice." Grabbing the trumpet, he put his nose against the microphone and yelled out: "I'm your own father; I'm in St. Luce, Missouri, United States of America." "Uncle Jerry is well," replied the voice. "He went to town to-day. I got yer last letter. Uncle Jerry is goin' to take Toby Mealin's land. Give my love to mother." The voice was silent and McNeal hung up the trumpet, saying: "Howly Moses, what an age of invenshun this is." He then set off to tell the "owld ooman" to come down and talk to Ireland from Mullally's sale stable.

Electric Light for the Brooklyn Bridge.

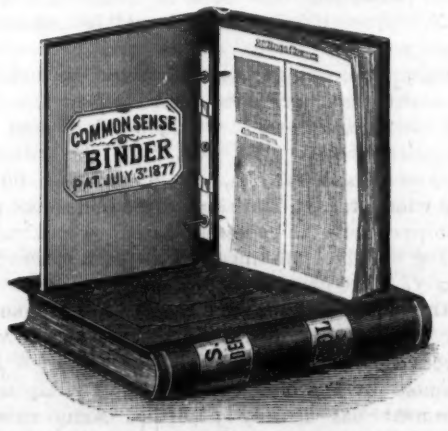
The most interesting occurrence in electric light circles during the past week was the award of the contract for lighting the Brooklyn bridge. On Saturday last the committee appointed by the Board of Trustees awarded the contract to the United States Illuminating Company of New York, which is the local organization for this city and vicinity of the United States Electric Lighting Company.

As this was a very important contract to secure, the competition for it has been very lively, and on Friday last a hearing was granted by the committee to the various companies who were bidders. At the meeting of the board, held a few days previous, Mr. Martin, the engineer, after a thorough and careful investigation of all the principal systems, reported in favor of the proposal of the United States Illuminating Company, but the other bidders desiring a further hearing, the committee above referred to was appointed. At the hearing before this committee representatives of the Fuller Electrical Company, the Brush-Swan Electric Light Company, the Brush Illuminating Company, the Edison Electric Light Company, the Schuyler Electric Light Company, the United States Electric Lighting Company and the Arnoux & Hochhausen Electric Company were present to advocate the adoption of their respective systems. The committee gave a full hearing to all, and inquired very carefully into the matter, and, as above stated, sustained the engineer in his opinion. The system used will be the Weston arc system, and the plant will consist of seventy arc lamps, together with the necessary dynamos and engines. The lamps will be placed on both sides of the roadway and arranged in two circuits, in such a manner that, should any accident happen to one circuit, only alternate lamps on each side would be extinguished. The dynamos and engines will be placed in the engine-house near the pier, on the Brooklyn side.

The Weston system is too well known to require a description here. This important decision is a very gratifying one to the United States Company, and the lighting of this famous bridge cannot fail to be a strong card for the company. The effect as seen from the river, when the bridge is lighted, must be very beautiful. The contract calls for the completion of the work within sixty days. This looks as though an early opening of the bridge, for foot passengers at least, may be hoped for.

BINDERS FOR THE OPERATOR AND ELECTRICAL WORLD.

For the convenience of subscribers who desire to preserve their numbers of THE OPERATOR AND ELECTRICAL WORLD clean and neat for permanent binding or for handy reference, we have had made especially for this purpose a number of self-binders of the very best kind, handsomely bound in cloth. The binders are of the exact size for the paper, and each issue, as received, can be fastened in it securely without trouble. When the binder is filled it can, if desired, be permanently fixed



in a few minutes, making a volume almost equal in appearance to one specially bound. The cut above shows the appearance of the binder. Full directions accompany each one. The binder may be had at this office or by express (the receiver paying express charges) for $1.25, or will be sent postage prepaid, to any address, for $1.50. Address, W. J. JOHNSTON, Publisher,

No. 9 Murray street, New York.

Incandescent Electric Lights.

To the Editor of The Operator and Electrical World:

SIR: "To be or not to be," appears the question. It is nearly thirty years since the first practical application of incandescence by the passage of the electric current was made and exhibited, viz., in a ship signal light, consisting of a small coil of platinum wire set in a focus of a parabolic reflector and momentarily rendered white hot by a current from a galvanic battery by depressing a contact for circuit, which was to be done by the pilot when he desired to signal a passing vessel, the glass of the lamps being of red, green and white, to vary the signals. These lamps were publicly exhibited by Prof. Stone at the Polytechnic Institute, Brooklyn, in 1858. What ever became of this invention the writer knows not. The vacuum subsequently applied to such lamps was the first step toward rendering such a method of illumination in some degree permanent, and a number of years since the material improvement in the permanence to be obtained by excluding the air, and the diverse effects of different gases on such platinum so heated, were fully set forth and illustrated by Prof. Tyndall, in well-known and widely-read publications.

The popular idea in America that *we* invented the incandescent electric lamp is well known to be erroneous.

The substitution of carbon for platinum appeals to have been simultaneous in both Eastern and Western scientific centres, that is if the Patent Office records relating to the different varieties of incandescent lamps be any guide; and perhaps nothing can be more instructive in regard to the matter than that one class of inventors lays great stress upon a filament with a strong *grain*, so to speak, while another lays equal stress on a filament literally cross-grained; and yet another set calls for a pithy filamental construction, like punk. What difference in the light this makes, in operation, it takes a *prejudiced* expert to determine.

To a person familiar with the operations of electricity, light obtained by incandescence by the passage of a current through a *continuous* conductor always suggests waste. In order to obtain the light at all, a certain temperature must be obtained in the filament, and to attain this a certain definite amount of electricity, which costs money, must be furnished, and it is perfectly notorious in practical lighting with incandescent lamps that light does not follow simply because a current flows.

Compare the power which can be wasted on a set of lamps in maintaining them at bright red heat--which is not light—with the power necessary to light them effectually. It certainly does not look like an economical operation to provide a method and machinery which, when run at a *low speed*, will produce no practical result whatever, and that to obtain commercial success we must only provide high speed. In short, it looks very much like a steam engine in which the friction is so great that no amount of low pressure will operate it, and with the additional defect that an indefinite amount of force can run to waste unless the pressure be at once raised to a maximum and there maintained. If the power costs nothing, or is furnished by natural agencies, or is waste of itself, certainly no cheaper form of light than an incandescent lamp could be devised (though the same is true of about everything else that costs money). That the incandescent lamp is a practical success (the cost not being considered) is undoubtedly correct; but that it is a luxury, not a commonplace, seems equally evident. Why do not the electric light companies give the public a definite, exact statement of the comparative cost per hour of an electric incandescent lamp and a kerosene lamp of the same power?

It is an experiment easily made. The comparative cost of a battery current and a dynamo current with steam power is well known. They have only to set the incandescent lamp, with the number of cells necessary to light it, alongside the kerosene for a number of hours, weigh the chemicals and the oil, and compare and adjust the lamps on the photometer. The public would then have a very clear idea on the subject.

It is certain that if the general public is to indorse and support electricity for domestic light the day of mystery in such matters is about drawing to a close. Electricity is no longer a name for what we *do not understand*.

The understanding of many has received shocks enough on the subject, and they were not *in circuit* either. Those in circuit managed to escape. Queer, is it not?

J. MILTON STEARNS, JR.

BROOKLYN, N. Y.

Sounds in Telegraph Relays.

To the Editor of The Operator and Electrical World:

SIR: Since "P. M.," in your issue of Dec. 30, heard an electric ghost, and "S.," in the issue of Jan. 13 heard the ghost, and *almost* saw it, I beg space to more fully elucidate the true cause of those peculiar mutterings of the relay, of which I have often heard operators speak wonderingly.

A practical experience of twenty-one years with the telegraph in all departments, and four years with the telephone, has, with an observing eye, enabled me to learn a great many very interesting peculiarities of each.

The fact, well known to every operator, that any change in the intensity or power of current passing through the magnet coils of a relay produces a corresponding change in the magnetic force in the cores of that magnet is the key to the whole phenomenon.

In the experience related by "P. M.," the cause of the changeable current was attributable to one of three direct conditions, namely:

First. The wire on which the disturbance occurred may have received its current from a battery, from which one or more other wires were supplied, one of which was being worked at that moment, taking its proportion of the battery power when its key was closed, and when opened giving the whole battery power to the remaining wires, thereby varying the current on his wire, and causing his relay to exert a varying force upon its armature, which, when carefully adjusted, would produce the same letters as were being made on the working wire—in this case "H"—although, perhaps, being read from the backward stroke of the lever.

Again, his wire may have had the same ground connection at its terminal as the working wire, and that connection not being perfect, that is, having too much resistance, either from a badly kept battery or from lack of proper earth distribution, a portion of the current coming over the working line found an easier way to earth via his wire, although perhaps many miles longer, and consequently caused a variation in the normal current traversing his wire, either partially neutralizing it, or increasing it, accordingly as it was of the same or opposite polarity, producing the same effect as in the above case.

Thirdly, but least probably, it may have been caused by induction. If his wire ran parallel with and in close proximity to the working wire, and particularly if the atmosphere was damp, there would have been sufficient induction or leakage from the working wire to have caused the same variations in the current on his wire, with the same result as above.

One of the above causes was undoubtedly what produced the effect.

In the telephone, the working principle of which depends entirely upon a varying current, we have a much more perfect illustration of induction and distribution of working currents. For example, two telephone lines running parallel, even for a very short distance, in close proximity, even when not having the same ground connection at either terminal, are so sensitive to currents from induction that conversation can be readily carried on between persons, one of whom is on one wire and the other on the parallel wire.

Again, if we remove the "ground wire," or terminal wire at the central office of a telephone exchange, entirely, we are able to work the wires almost as well, the feeble current used in speaking over any one line being distributed over all the other lines centering at the switch-board where the "ground wire" has been removed; and, indeed, so perfect is the telephone and so very sensitive to the variable impulses, that the conversation over the one line mentioned can be distinctly heard over every other line connected with the same switch-board. Although that feeble current has been divided and subdivided and divided again in its distribution, yet, like the "ghost," it can plainly be heard.

B.

THE ELECTRIC LIGHT.

AN EDISON DISTRICT FOR BOSTON.—It is stated that a number of wealthy gentlemen of Boston are taking measures to establish a district on the Edison system in that city, similar to the one now in operation in New York, and have been conferring with Mr. Edison on the subject.

GOING TO EUROPE.—The London *Electrical Review* has heard that Mr. Johnson, of the Edison Company, is about to return to that country for the purpose of taking in hand the general management of the Edison Electric Light Company there.

THE PHILADELPHIA LEDGER OFFICE.—Mr. G. W. Childs, of the Philadelphia *Ledger*, has just arranged for his city staff the finest editorial rooms in this country. Among all the conveniences that taste or necessity can suggest, a costly brass chandelier, combining both gas and electric light, hangs over each desk, and telephonic communication has been arranged with all parts of the city.

A NEW COMPANY.—An application has been filed at Harrisburg, Pa., for a charter for a new electric light company, to be located at Pittsburgh. The incorporators are prominent business men of Pittsburgh, and the company is to develop the patents of Mr. McTighe, a well-known inventor, of that city. The McTighe dynamo is said to not differ essentially in principle from the Brush machine. The advantages claimed for it are that it weighs but six hundred pounds, can be taken apart and put together in two hours, and realizes greater economy.

THE THOMSON-HOUSTON SYSTEM IN BOSTON.—The Boston *Advertiser* celebrated its removal to new and enlarged quarters on Monday by issuing a twenty-page paper, containing a review of the principal business enterprises of Boston. From this we learn that the American Electric and Illuminating Company, of that city, which uses the Thomson and Houston arc-light system, is making rapid progress. The company was incorporated last May, and began operations in September. It has now 200 lights in use in Boston, with contracts for 100 more. The central lighting station is situated in the basement of the Massachusetts Charitable Mechanic Institute on Huntington avenue. The motive power is communicated to the dynamos by means of a one hundred and fifty horse-power Wheelock engine, two fifty horse-power Lawrence engines, two rotary Wing engines, one of thirty and one of one hundred horse-power. The last named engines are the first of the kind ever made or used for this purpose which will work with a direct attachment to the dynamo. The total lighting capacity of the present central station of the company is about 1,000 lamps, of 2,000 candle-power each. There are about ninety towns and cities in New England now dependent entirely upon gas, for which the company has already procured a number of charters, and it is intended to establish sub-companies throughout the New England States as rapidly as possible. The total number of arc lights in use in the United States is said by the *Advertiser* to be over 75,000.

TELEPHONE DEPARTMENT.

BLUEBIRDS OVER THE TELEPHONE.—A recent new song is, "Mabel, Hear the Bluebirds Sing." We fear Mabel will not be able to hear the bluebirds sing for some time yet unless she has a telephone in the house. You can hear most anything you want to in a telephone.—*Telephone Primer.*

A NEW USE FOR THE TELEPHONE.—Mrs. Frazer became insane the other day while on a visit to Ottawa. At the Russell House in that city she created some excitement by demanding an interview with the Marquis of Lorne, and could only be made quiet by an imaginary telephonic conversation with His Excellency.

"THE TELEPHONE PRIMER."—Under this title Messrs. C. L. Knapp & Co., the enterprising dealers in telephone stocks, of Lowell, Mass., have issued a neat little pamphlet, giving many statistics in regard to the telephone business, of interest to investors, besides much information of general interest relating to telephony.

AN INGENIOUS TELEPHONE OPERATOR.—The night operator at the Lowell central office, besides his regular salary, receives a handsome income from the manufacture of cords. He makes all the cords used by the entire list of companies which come under the Lowell management. The cord, it will be understood, is the means of attachment of the hand telephone to the bell.—*Telephone Primer.*

A NEW TELEPHONE WIRE.—The "spiral" wire used by the Boston Nail Company in making its nail-driving screws is said to have been found to have decided advantages for the use of telephones, and the company is reported to be using its machines almost exclusively for turning out wire for this purpose. Several telephone experts and gentlemen holding the largest financial interest in the telephone, it is stated, have taken an interest in the company.

DASHES HERE AND THERE.

NEW COMPANIES IN ENGLAND.—The nominal capital of the new companies brought out in England in 1882 was £84,500,000. About one-fifth was of companies dealing with electricity.

THE WESTERN UNION BOOKS.—The Executive Committee of the Western Union Telegraph Company decided on Wednesday to keep the transfer books closed until the morning of March 1.

A "BULL" ON THE READING.—"Damett," for "Dallett," was recently made by a profane operator on the Philadelphia & Reading line. He says it was a bad day and the duplex worked hard.

AIDING THE HOMELESS.—Among the contributions to aid the sufferers by the floods in the West was one of $1,000 from Mr. Jay Gould. The Western Union Telegraph Company has authorized its officers to transmit all messages for the benefit of the sufferers free.

A COMPLIMENT TO EDISON.—A corresondent writes: "I have named my baby 'Edison.' My wife said, 'If it be a boy, his name shall be Thomas Edison,' but as it is not that kind of a baby, we name her Kate Edison. We are living, as New Yorkers say, 'Out West.' If I should mention the place, Mr. Edison might give the baby one of his patents."

THE WESTERN UNION'S MILEAGE.—The wires controlled by the Western Union Telegraph Company heretofore, including those of the Atlantic & Pacific and American Union Companies, which they absorbed, were 375,000 miles. The Mutual Union owned and operated 40,000 miles, which will thus give the Western Union 415,000 miles of wire.

THE UNITED PRESS.—Mr. Schoonmaker, general manager of the United Press Association, when asked what effect the consolidation of the companies will have upon his association, said he thought it would be of material benefit to them. "Our lease of wires," he said, "is for a term of ten years, and the Western Union will be in duty bound to carry out the contract of the Mutual Union."

ANOTHER FATALITY CHARGED TO A TELEGRAPH OPERATOR—On the Central Ohio division of the Baltimore & Ohio Railroad, on Monday, two freight trains collided in the Franklin tunnel, seven miles west of Bellaire, killing an engineer and fireman. The blame is laid on a telegraph operator, who, it is said, failed to notify the west-bound train to take the siding. The east-bound train was running wild.

GROWTH OF THE TELEGRAPH BUSINESS OF STRASBURG.—German newspapers have made a comparison of the postal and telegraphic business done at Strasburg since it became a part of the German territory, with the returns for the period immediately before its acquisition, in order to show an "enormous start in business." Thus the number of telegrams forwarded in the last year of French rule was 159,000, as against 194,000 in 1881, and the receipts for postage and telegraph fees 455,758 marks, as against 989,561 marks in 1881.

THE SIGNAL SERVICE TROUBLES.—A press dispatch says: Gen. Hazen, the Chief Signal Officer, wrote to the Secretary of War on the 16th inst. that he had asked for an investigation of the charges against the Signal Service Bureau and its officers by a Senate committee, because he was anxious that Congress, which had before it legislation affecting the bureau, should examine the charges. He renewed his request. Secretary Lincoln, in his reply, disapproves the application, but says that unless Gen. Hazen asks for a court of inquiry to examine the charges he will request the President to appoint such a court.

A NEW TELEGRAPHIC REPEATER.—We are informed that Mr. R. C. Edwards, an old-time telegraphist, has invented a quadruple automatic repeater, simple in construction, efficient in working, easily adjusted and which can be put to a variety of uses. The inventor says it can be used as a single, double, treble or quadruple repeater at pleasure, and by a trifling addition can be used on a still greater number of wires, all working automatically, one into another. Mr. Edwards expects it to be of value on fire-alarm lines, by allowing an alarm to be automatically repeated from one district into five or six others. He has applied for a patent.

THE POSTAL TELEGRAPH.—This company, its officers say, is to use a compound wire of steel and copper that cannot be affected by storms or weather and will last 100 years. Ordinary wires last only ten years. They will use the Leggo automatic and Gray harmonic system which they say gives the lines a capacity to handle over 2,000 words per minute on each wire in opposite directions. Two of their wires will, it is claimed, have far greater capacity than a line of sixty iron wires equipped with ordinary Morse instruments now in use. Last week they sent 900 words per minute between this city and Olean, N. Y., a distance of 400 miles, using the Leggo system.

STOCK QUOTATIONS.—Telegraph, telephone and electric light stocks were quoted as follows on Wednesday:

	Bid.
Western Union Telegraph	80⅝
Mutual Union Telegraph	20
American Cable	64¾
American District Telegraph	30
Bankers and Merchants' Telegraph	126
American Bell Telephone	283
Mexican Telephone	4
Edison Electric Illuminating	85
Edison Electric Light	487½
Fuller Electrical	33

DAMAGES AGAINST WESTERN UNION.—The Court of Appeals at Richmond, Va., on Feb. 15 rendered an opinion in the case of Reynolds Brothers, of Norfolk, against the Western Union Telegraph Company. The plaintiffs filed a cipher message, consisting of nine letters, in the Western Union office at Norfolk. The company's employés failed to send the message. Reynolds Brothers brought suit, claiming that they had sustained damages to the amount of $1,300 by the failure to transmit their dispatch. The company claimed that it was not under obligations to do more than refund the tariff on the message. It further pleaded that it had paid the penalty of $100 imposed by the State laws for its neglect. The jury awarded the plaintiff e damages claimed, the defendants appealed, and the

Court of Appeals affirmed the judgment of the lower court, all of the members concurring in the opinion except Judge Lewis, who dissented.

STORAGE BATTERY LITIGATION.—In the New York Supreme Court, on Feb. 14, Judge Barrett dissolved the temporary injunction granted by Judge Donohue in the case of the Electrical Power Storage Company, Limited, against Walter B. Whiting and others. This was a suit brought by an English company claiming to have an assignment from the parent Faure company, *La Force et la Lumière*, of Belgium, to recover a certain amount of stock alleged to be due from the American company to the Belgian company in payment for the Faure patents for the United States, Canada, Mexico and the Central American States. The defense asserted that only two patents had been transferred, instead of fifteen, as required by the agreement, and, further, that the English company had procured the assignments illegally. It was charged that the suits were brought in the interest of the Brush Electric Light Company, and the judge, in dissolving the injunction, said he had grave doubts as to the good faith of the parties bringing the suits.

AN ELECTRO-GENERATIVE TORCH.—Dr. Brand, whose recent success in producing electricity by ordinary combustion is full of promise, is still prosecuting this new line of research. His latest production is reported to be a torch or candle which in burning produces an electric current. As described by *Engineering*, of London, England, it is made by compressing a paste of coal dust and treacle in a mold along with two wires which issue from one end and serve as the negative electrode. The stick thus obtained is wrapped in a thin sheet of asbestos paper covered with copper wire to serve as the postive electrode. The core is then dropped into a bath of fused nitrate of potash until a layer from .2 to .25 inch thick adheres to it. In the candle thus obtained the carbonaceous agglomerate forms the wick and the nitrate takes the place of the wax or tallow. On setting fire to the wick it continues to burn, and on connecting the wires to a galvanometer a current will be observed during the whole time of combustion. This current is not very regular, however, owing to a crust of nitrate and to the resistance offered by the wires. It is stated that ashes mixed with the nitrate, in the proportion of two parts of ash to one of the salt, cause the candle to burn more regularly and to give off a remarkably steady current.

NEW YORK CITY ITEMS.

Echoes from 195.

Mr. B. F. Bunce, of the Albany quad, has gone to Oil City, Pa.

Mr. J. J. Calahan, of 195, has several etchings in the art exhibition at the National Academy of Design, New York City.

Miss M. Lederer has resigned to accept a position with Messrs. Dominick & Dickerman, brokers, 661 Fifth avenue.

Mr. George Weller, manager of the Sixtieth Street Stock Yards, visited the operating room at 195 with a party of friends last Monday.

Mr. Thomas M. Miller, Boston printing operator, resumed work last Friday after an illness of three months. He is still quite feeble.

Some time past mice were quite prevalent in the operating and battery rooms, and made themselves especially familiar with the night force. Mr. S. B. Lambdin, who was then busy with his book of jokes, avers that on more than one occasion a specimen of the *mus musculus* deliberately walked across his manuscript. Recently a cat has been added to the night force, since which time the mice have departed for parts unknown.

Mr. Thomas Finnegan, the doorkeeper of 195, is probably known to every operator who has worked in the office or old 145 Broadway, within a score of years. Tom, as he is called by everybody, has been in the telegraph service for thirty-seven years, and has an unlimited stock of telegraph lore of other days. He says that 25 or 30 years ago Morse operators received from $50 to $60 per month, and the House printing operators $80, with 50 cents an hour for over time. He recalls the case of one House operator, who used to charge each newspaper in the city 50 cents per hour for extra service, and made thereby from $15 to $20 "extra" per night, until the company discovered the practice and stopped it. Mr. Finnegan carries a watch which is competent to regulate the Western Union time-ball. As a weather prophet his opinion is sought by everybody.

F. de V. Okeburg, a copying clerk in Vice President Van Horn's room in the Western Union building in this city, attempted to commit suicide in the Hotel St. André on the 17th inst. by smothering himself with gas. When they found him the physicians applied the usual remedy for asphyxia, but could not restore the man to consciousness. After every ordinary remedy had been tried, it was finally decided to attempt to restore him by means of the Blundell system of transfusion of blood. Edward Banks, a jet-black negro, twenty-one years old, in healthy condition, offered himself to the physicians, who opened a vein in his arm. The blood was received in a cup and from that transfused into an opened vein in the arm of the dying man until nearly a quart had been used. The result was successful and the would-be suicide soon regained his senses. The most curious part of the story is that when the would-be suicide's wife was brought he refused to speak to her, asserting that he did not know her. He also refused to speak to his child, but when Banks, the colored man whose blood brought him back to life, entered the room Okeburg immediately addressed him as "Dear brother." He added that "Banks is my brother and I do not know this woman." Okeburg is a Swede and was considered a steady and reliable young man.

Other City Items.

Mr. Frank Phillips, of the central cable office, is spending a few weeks in Kingston, Ont.

Mr. Wm. H. Leach, receiving clerk at 135 Broadway, has accepted the managership of one of the Manhattan District Messenger Company's offices.

The cases of George E. Rood, conductor, and William C. B. Rawson, telegraph operator, charged with having been the cause of the fatal collision of trains in the tunnel at Fourth avenue and Eighty-sixth street, this city, on Sept. 22 last, were called in the Court of Oyer and Terminer, on Monday. Their trials were set down for the 28th inst.

The annual meeting of the New York Electrical Society will be held in the rooms of the society in the Metropolitan T. & T. building, corner of Greenwich & Liberty streets, on Friday evening, March 2. Among the business to be transacted will be the election of officers and standing committees for the ensuing year.

The Mutual District Telegraph Company issued a circular on Monday denying that it had any connection with the Mutual Union Telegraph Company or any other district telegraph company. This sets at rest the rumor that arrangements were being made for the consolidation of the Mutual Union, American District and Manhattan District telegraph companies.

The Gold & Stock Telegraph Company, it is announced, will hereafter furnish its customers with two "tickers" each. On the regular instrument every transaction, no matter what its importance, will be reported in its regular order. In order that operators may not have to wait the sometimes slow course of the regular report, an "express ticker," as it will be called, will be put in. This will record sales and transactions in active stocks only, which it will be able to report the minute they occur, and those which are unimportant will be omitted entirely.

The Western Union is to erect a new building in this city at Nos. 16 and 18 Broad street. Dr. Green says that the building will be commenced on the 1st of May, and that the plan is to make it about eight stories high. By the arrangement of ex-Governor Morgan, the lease of No. 16 was secured two months ago for 21 years, and No. 18 had been offered on the same terms. No plans have yet been drawn for the structure. It is proposed to use the building for the cable business. The purposes of the Gold & Stock Telegraph Company and the land business sent in there would also be transacted directly from it. Dr. Green says there is no intention of abandoning the present main building on Broadway.

PERSONAL.

NIAGARA FALLS.—Mr. J. J. Forbes King has been assistant to Manager F. C. Belden of the Western Union office for five years, and has made a host of friends at the Falls.

ST. JOHN, N. B.—Business has been quite dull for the last two months at St. John, but since Parliament has met at Ottawa it is much livelier. Mr. W. C. Clinch is the unlucky one to copy Ottawa this session. Local assembly meets at Fredericton, Feb. 22, then we will have our hands full. X. X.

WINNIPEG, MAN.—The first telegraph office was opened in Manitoba about eleven years ago, by the old Northwestern Telegraph Company, the Government contributing enough wire to construct 225 miles of line. The office was in Winnipeg, and was placed in charge of Mr. H. Macdougall, who did all the work, and was not overworked. Mr. Macdougall is still manager at Winnipeg for the Great Northwestern Company. The business has grown rapidly. At the end of 1881 there were 25 employés, including the messengers. At that time there was a great "boom" in Manitoba, and nearly every telegram sent was about real estate. The business has since settled down to a steady and paying one. At present there are seven lines in the Winnipeg office. Mr. J Stronach, chief operator, has been in the office about eight years.

BALTIMORE.—Mr. A. H. Bauer, Baltimore manager of the late Mutual Union Telegraph Company, will become the electrician for the Faure Electric Light Company in this city, and others of the employés are preparing to make changes. The Baltimore office has not as yet been ordered to close by the Western Union authorities, but such an order would not cause a surprise. There are nineteen chiefs, operators and clerks. It is said that a first-class operator need never be out of employment, as there is a constant demand for them. A Mutual Union operator said he had been left out five times by telegraph consolidations, but lost no time from work in consequence. These operators for opposition companies think the Western Union will continue to absorb all the other companies that compete with it except the Baltimore & Ohio. A couple of the Mutual Union men expect to go into the Baltimore & Ohio service. Mr. Wm. McAlpin will go with the American Rapid.—*Baltimore Sun.*

AUSTIN, TEXAS.—Mr. W. A. Pillow, chief operator of the Austin office of the Western Union Company, who left for San Antonio on Feb. 12, to take charge, as manager, of the Western Union office in that city, was on Feb. 9 presented with an elegant gold-headed cane, a beautiful silver butter dish and a silver soup ladle, elaborately engraved with his initials and the compliments of the office. Mr. Pillow takes with him the best wishes of the citizens of Austin. The rush of business, caused by an unusual amount of work in the Capitol, gives the office a lively appearance. It is ably handled by Messrs. Gaines and Morris in the day-time and John Winds and Jos. Adams at night. The transformation of "8 A.M.; Palestine O. K." into "Tham pales line O. K." shows that the rising generation of telegraphers is not going to be behindhand in the matter of "bulls." While listening to a dispute about a message, on the way wire, the following was overheard: "Cn you wak g to taj," which, after considerable thought, was deciphered to mean "If you want me to take——." The remainder was lost. Z.

ST. LOUIS & CAIRO (NARROW GAUGE) RAILROAD.—Mr. J. W. Ravlin is train dispatcher, at East St. Louis, with Messrs. C. Willoughby and N. Brown as assistants. Mr. W. Kochersperger is operator at East St. Louis, Mr. J. M. Halstead at the shops, Mr. W. H. Miller at Columbia, Mr. G. A. Gauen at Waterloo, and Mr. P. J. Gauen at Burksville. Mr. L. C. Stebbins, an old-timer, is agent and operator at Red Bird, with Mr. Hoth as night operator. Mr. Lee J. Barrett is agent and operator at Baldwin, and Mr. A. M. Hoener, another old-timer, at Sparta, with Mr. Henckler as assistant and Mr. John Campbell as night operator. Mr. C. W. Lyon is agent and operator at Campbell Hill and Mr. J. R. Holmes at Ava, with Mr. E. Jornigan as night operator. Mr. G. H. Short (still another old-timer) is agent and operator at Murphysboro, assisted by Mr. H. W. Beecher. Mr. J. Gregory is operator at Pomona, Mr. John Lewis at Alta Pass, Mr. Richard Grear at Jonesboro, Mr. Harry Morgan at Hodge's Park and Mr. Ed. Weir at Cairo. The company is erecting extensive shops at East St. Louis, which are nearly completed. The train dispatcher's office will soon be removed from East St. Louis to St. Louis. JIM CROW.

CEDAR RAPIDS, IOWA.—We regret to learn of the death of Mr. Louis A. Bein, master of transportation and superintendent of telegraph of the Burlington, Cedar Rapids & Northern Railway, which occurred at his home in Cedar Rapids, on the 8th inst., of cancer. Mr. Bein was thirty-four years of age. He was at one time connected with the Indianapolis *Journal*, where he gained a good reputation as a journalist. He entered the service of the B., C. R. & N. R. R. eight years ago, as assistant train dispatcher, and was promoted in turn to train dispatcher, train master, superintendent of telegraph and master of transportation. He leaves a wife and one child. An esteemed correspondent writes: "The remembrance of his many kind acts toward us all will ever remain fresh in our memories. On New Year's day he presented to each dispatcher in his employ (eight in all) a complete set of new instruments, consisting of a Bunnell steel lever key, a patent arch sounder and a 150-ohm relay, remarking as he did so that he was a great advocate of 'system,' and liked to have everything just right. This discloses the secret of his success. Without any extraneous help, by sheer force of character, he won his way. A true and just man, he commanded the respect and esteem of all with whom he came in business or social contact. He bore a long and trying illness with patience and submission, and has entered into his rest followed by tender regrets and loving memories, and bequeathing in some mitigation of the grief for his loss the record of an unsullied and useful life."

BORN.

PEARCE.—On Feb. 19, 1883, to Mr. Harvey Pearce, operator Western Union Telegraph Company, Grand Central Depot, New York city, a son.

MARRIED.

MAXWELL—READ.—At Hampton, Ga., Jan. 30, 1883, Mr. Arnold T. Maxwell, agent and operator at Hampton, to Miss Mamie E. Read, of Hampton.

ELECTRICAL PATENTS ISSUED.

Week ending Feb. 13, 1883.

Automatic shunt for magneto-electric generators; Ezra T. Gilliland, Indianapolis, Ind.	272,234
Carbon electrode for electric lamps; James E. Atwood, Troy, N. Y.	272,017
Dynamo-electric machine; Edwin J. Houston, Philadelphia, Pa.	272,256
Device for regulating the electrical transmission of power; Edward Weston, Newark, N. J.	272,362-3-4
Dynamo-electric machine; Edwin Weston, Newark, N. J.	272,356
Electric clock; D. Fred. Sweet, Hastings, Mich.	272,100
Electric incandescent lamp; Philip Diehl, Elizabeth, N. J.	272,125
Electric railway signal; Wm. W. Le Grande, Louisville, Ky.	272,142-272,276
Electric gas generator; Charles E. Ball, Philadelphia, Pa.	272,187
Electric arc lamp; Nathaniel S. Keith, New York, N. Y.	272,262
Electric speaking telephone; Allen W. Rose and Charles A. Cheever, New York, N. Y.	272,329
Electro-magnetic retarding device; Elihu Thomson, New Britain, Conn.	272,353
Electric arc lamp; Edward Weston, Newark, N. J.	272,353
Galvanic battery; Theodore L. Kauffer and James Gerson, Boston, Mass.	272,058
Insulator for electric conductors; Theodore Mace, Plainfield, N. J.	272,069
System for the electric transmission of power; Edward Weston, Newark, N. J.	272,365
Telephone; Thomas A. Edison, Menlo Park, N. J.	272,034
Telegraphic relay; Thos. Cochran, Brooklyn, N. Y.	272,210
Underground conduit for electric wires; J. S. Du Bois, Camden, N. J.	272,221

BUSINESS NOTICES.

A PORTABLE ELECTRIC LIGHTER.—A portable electric lighter for $5 is being extensively sold by the PORTABLE ELECTRIC LIGHT CO., of 22 Water street, Boston. It is an economical and safe apparatus for lighting for home and business purposes.—*Scientific American, New York, December* 16, 1882.

From London advices of Feb. 3, we learn that BEKLY'S ELECTRICAL DIRECTORY was to be shipped on Feb. 10 for New York and must, therefore, soon be here. A break in press machinery caused delay.

The attention of persons interested in local telegraph and telephone organizations is respectfully called to the electric lighting system of THE FULLER ELECTRICAL COMPANY, and the practicability of making arrangements with that company for the introduction of its apparatus, either in isolated plants or through the formation of local companies desiring to engage in the business of electric lighting. The specially valuable features of this company's system may be seen by examination of its apparatus in Boston, Worcester, Providence, New York City, Brooklyn, Jersey City, Paterson, Philadelphia, Hartford, Lancaster, Scranton, Syracuse, Rochester, Buffalo, Pittsburgh, Wheeling, Steubenville, Xenia, Dayton, Grand Rapids, Chicago, Springfield, Belleville, St. Louis, St. Paul, and many other smaller places throughout the country. Correspondence is invited. THE FULLER ELECTRICAL COMPANY,
44 East 14th street, New York City.

The ingenious device known as the APPLEGATE INVISIBLE ELECTRIC MATTING ALARM, which we have noticed on several occasions, we learn is coming into very extensive use, and sub-companies are being organized throughout the country for its introduction. It has been adopted in New York by the following, among other well-known citizens and firms: Messrs. Geo. R. Blanchard, John Hoey, R. G. Rolston, A. A. Low & Co., American Loan & Trust Co., Ralli Bros., and S. M. L. Barlow, and in Philadelphia by the Philadelphia National Bank, Messrs. Henry Bentley, John Wanamaker, John Lucas, Allen Middleton and Partrick & Carter, with many others elsewhere. The matting takes up no room, can be placed anywhere under carpets, etc., and never fails to give notice of the entrance of any one to a room, either by doors or windows, or of the approach of any one to any desired portion of a room. It can be made to produce a momentary or continuous alarm, at pleasure, and, if desired, will also light the gas at night upon any one entering the room.

All Persons Sending for

Catalogues or ordering articles advertised in our columns will do us and our Advertisers both a great favor by mentioning that they saw the advertisement in

The Operator and Electrical World.

JUST THE PEN FOR OPERATORS.

Esterbrook's Mammoth Falcon No. 340.

LARGE ALL-WOOD PENHOLDERS TO SUIT.

Sample dozen Pens and Holder 40 cents.

THE ESTERBROOK STEEL PEN CO.,

Works, Camden, N. J. 26 John St., N. Y

ELECTRICAL BOOKS.

Davis & Rae's Electrical Diagrams and Connections. Oblong, 8vo., cloth, 32 full page illustrations; 2d edition, Price $2.00

Pope's Modern Practice of the Electric Telegraph; 9th edition, revised and enlarged. 8vo., cloth..... $2.00

Copies Mailed on Receipt of Price.

D. VAN NOSTRAND,

23 Murray and 27 Warren Sts., N. Y.

HAINES BROS.,

Promoters and Brokers

55 BROADWAY, N. Y.

Electrical Stocks a Specialty.

Gelatinized Fibre.

(Trade Mark.)

The New Substitute for Hard Rubber.

Adopted by the leading Electric Light Companies and Manufacturers of Electrical Apparatus, being a better non-conductor, lighter and more durable, at half the cost.

Send for samples, circulars and prices to

COURTENAY & TRULL,

No. 17 Dey St., New York.

THE BUTLER HARD RUBBER CO.

Electrical Supplies,

33 Mercer St., New York.

Manufacturers of

Sheet Rubber, Rods, Tubing, Etc.,

RUBBER HOOK INSULATORS.

Key Knobs, Switch Handles, Magnet Covers, Magnet Heads, Window Tubes, with Heads, Battery Cells, Battery Syringes, And Specialties of any Required Character.

PINS AND BRACKETS.

We are now prepared to furnish

Pins, Plain, at $10 per thousand.

Pins, Painted, $11 per thousand

Brackets, Plain, $13 per thousand.

Brackets, Painted, $15 per thousand.

BEST QUALITY OF OAK.

SPECIAL REDUCTION ON LARGE ORDERS.

L. B. HARRIS,

Manchester, N. H.

THE CARBONS

MANUFACTURED BY THE

American Carbon Co.,

ST. LOUIS, MO.,

Are Warranted the Best

FOR ELECTRIC LIGHTS.

L. G. TILLOTSON & CO.,

AGENTS,

5 and 7 Dey Street, N. Y.

CONSUMPTION.

I have a positive remedy for the above disease; by its use thousands of cases of the worst kind and of long standing have been cured. Indeed, so strong is my faith in its efficacy, that I will send TWO BOTTLES FREE, together with a VALUABLE TREATISE on this disease, to any sufferer. Give Express & P. O. address. DR. T. A. SLOCUM, 181 Pearl St., N. Y.

JUMBO'S JOLLY JOKES.

The most rambunxious, ferocious, flat-footed, unearthly, uproarious and excruciating jokes ever inflicted on a long-suffering public.

Sixty-four closely-printed pages all entirely new and original matter. Very little telegraph about it. **Price 15 cents. Two for 25 cents. Stamps taken.**

By S. B. LAMBDIN, Opr., at 195 B'way, N. Y.

Its readers pronounce the jokes to be "big," "rich," "superior," "great," "inimitable," "immense." etc. The man in the moon says it's his only solace in his otherwise desolate journey.

IT SPEAKS FOR ITSELF.

Buy it. Read it. The "horse laffs" and guffaws it will shake out of you will save you a small-sized fortune for bracers, tonics, persuaders, appetizers, etc. Shake. Orders will receive prompt attention. Agents wanted. Address, **SAM'L B. LAMBDIN,**

58 Orange Street, Brooklyn, N. Y.

JOHN B. SABINE,

ATTORNEY AND COUNSELOR-AT-LAW, NOTARY PUBLIC

AND

PRACTICAL TELEGRAPHER.

102 Broadway, New York.

Special attention given to the *Law of Telegraphs;* to the incorporation of *Telegraph, Telephone and Electric Light Companies;* to all litigation arising in the construction and maintenance of lines; to the defense in all claims for errors and omissions in the transmission of messages, and for injuries resulting from the use of Electric light and other wires.

Letters patent obtained for all electrical inventions of merit in all countries.

Collections made for manufacturers and others.

Correspondence Solicited.

THE

WEST INDIA

Telegraph & Telephone Co.,

LIMITED.

CAPITAL STOCK,

$150,000

Shares $10 each. Full Paid and Non-Assessable.

Transfer Office, Long Branch, N. J. T. C. Morford, Registrar of Transfer.

This company has acquired and owns all the telephonic rights formerly the property of the Continental Telephone Co., and Tropical American Telephone Co., Limited, including the *exclusive right*, for a term of years, of selling, leasing, and using in the Islands of Hayti, San Domingo, Jamaica, Porto Rico, Viq u>, Culebra, St. Croix and St. Thomas, Bell Telephones, Blake Transmitters, and all other telephonic apparatus manufactured by the AMERICAN BELL TELEPHONE CO., under patents owned or controlled by it in the United States and Canada. Has been granted concessions from the Governments of the Islands for exclusive rights to the Exchange System for telephones.

This Company BUYS its Telephones and Transmitters, and thereby

Avoids Paying Royalties.

A PORTION OF THE STOCK FOR SALE.

Address:

THE WEST INDIA TELEGRAPH & TELEPHONE CO.,

CHILLICOTHE, OHIO.

UNITED STATES

MUTUAL ACCIDENT ASSOCIATION

NO. 409 BROADWAY, NEW YORK.

$5,000 ACCIDENT INSURANCE. **$25** WEEKLY INDEMNITY. MEMBERSHIP FEE, **$4.** ANNUAL COST ABOUT **$10,** *which is about one-third the rate charged by stock companies.*

Write for Circular and Application Blanks. European Permits.

C. B. PEET (of Rogers, Peet & Co.), **President.** **J. R. PITCHER, Secretary.**

Yellow Cedar Telegraph Poles,

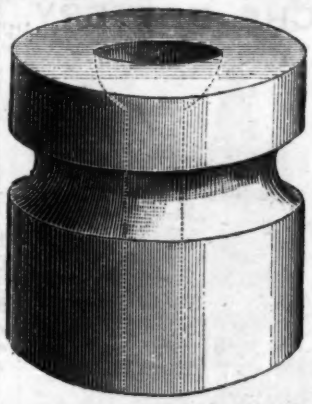
Railroad Ties, Paving Timber and Fence Posts for Telegraph, Electric Light, Telephone and Railroad Companies' Use.

The Michael Bay Lumber Co. (Limited) have on hand and cut to order Yellow Cedar Telegraph Poles, which will last from eight to ten years longer than white cedar or chestnut. Yard and office at Buffalo, Black Rock, N. Y. Standard poles, 25 feet, 6 inch top; 30 feet, 6 and 7 inch top, and long poles from 35 to 60 feet in car load lots from Black Rock, and by vessel loads at Lake Erie and Lake Michigan ports on the opening of navigation. Fifty thousand ready to deliver i April and May. Correspondence solicited. All orders addressed to

A. A. COLBY, AGENT, BUFFALO, N. Y.,

Post Office Box 297 Will receive prompt attention.

Hard Porcelain Insulators,



LARGE AND SMALL,

FOR

Telegraph, Telephone

AND

Electric Work.

UNION PORCELAIN WORKS,

300 Eckford Street,

GREENPOINT, N. Y.

AN HONEST OFFER.

FOR MORE THAN TWO YEARS WILSONIA MAGNETIC APPLIANCES have been used by the SICK and AFFLICTED in every State in the Union. But it is only within the last six months that we have been able to ascertain THE PROPORTION OF CURES EFFECTED. Not including PARALYSIS, in its various forms, ASTHMA and one or two other forms of disease, the cures have been ABOUT EIGHTY-FIVE IN EACH ONE HUNDRED CASES TREATED. With this experience we feel warranted in offering to each purchaser a

WRITTEN GUARANTEE

to return the amount IN FULL if a cure is not effected within a given time. When this REFUND is requested, the PATIENT will only have to make an AFFIDAVIT (on forms supplied with guarantee) that he has worn the APPLIANCES as directed and for the specified time. IN making this offer we are consulting our own interests. THOUSANDS of persons in moderate circumstances have stated their willingness to try our treatment if a cure were guaranteed. They said, "We would give twice the amount you ask if we were certain we would be cured, but we cannot afford to lose the money, if we were not."

As to our responsibility, we are permitted to refer to the NATIONAL PARK BANK of this city. WE require from each person a brief statement of his case, giving SYMPTOMS, ETC., and AGE, so that we may be able to advise him what appliances are needed to effect a cure. WE have found WILSONIA an almost unfailing cure for CATARRH, INDIGESTION, DYSPEPSIA, CONSTIPATION, NEURALGIA, RHEUMATISM, NERVOUS DEBILITY, SLEEPLESSNESS and diseases of the LIVER and KIDNEYS. THESE are the forms of disease that the MAJORITY of persons who are out of health suffer from. WITH regard to ASTHMA, TIC DOULOUREUX, HEART DISEASE, and a few other obstinate diseases that usually baffle all medical skill, "WILSONIA" AFFORDS GREAT RELIEF, if it does not effect a cure, and the lives of this class of sufferers are comforted and prolonged.

In the list of what are called incurable diseases, viz.: PARALYSIS in its many forms, DISEASE OF THE SPINE, DIABETES, PARALYSIS WITH RHEUMATISM, and other complications, so many cures have been effected that we are justified in asserting that NO ONE SHOULD DESPAIR of obtaining relief without trying "WILSONIA." IN SUPPORT OF OUR ASSERTIONS we quote extracts from LETTERS in our POSSESSION. Many of those who have been cured object to the publication of their names. In these cases we give one initial. WE WILL SHOW THE ORIGINALS OF THESE LETTERS TO ANY ONE WHO DESIRES TO SEE THEM.

Catarrh!

Deafness!!

Dyspepsia!!!

Read About This Case.

NEW HAVEN, Conn., Nov. 15, 1882.

In my childhood I was troubled with catarrh which impaired my hearing. As I grew older both catarrh and deafness grew worse. Besides I have been a great sufferer from dyspepsia. On Nov. 15, 1881, I put on the Wilsonia Appliances and to-day I am entirely cured of dyspepsia and catarrh, and my hearing is restored. Language cannot express my gratitude for what "Wilsonia" has done for me.

THEODORE W. WARREN,

Twelve years with Winchester Arms Company.

Dr. Price, of Baltimore, Md, writes: "I have recommended 'Wilsonia' in a number of cases in my practice; they act very satisfactorily."

Dr. J. H. Demorest, One Hundred and Twenty-fifth street, N. Y., testifies:

Mrs. John Raynor, 137 East One Hundred and Twenty-sixth street, was cured in six months of chronic facial erysipelas, commonly called "St. Anthony's Fire," by Wilsonia Appliances, after the unsuccessful treatment by medicine.

Rheumatism!

THIRD CHURCH,

NEW HAVEN, Conn., Feb. 8, 1882.

I have worn Wilsonia Appliances for several months for rheumatism in its most aggravated forms. Since putting them on I have been almost wholly relieved and have regained much of my former vigor and elasticity. I am grateful, indeed, for what they have done for me.

S. R. DENNEN, D. D.

259 NINTH STREET, Brooklyn, Oct. 21, 1882.

I am happy to say that, though I am seventy-one years old, your Wilsonia Appliances have made a new man of me. I had rheumatism in my knees, pain in the small of my back and cold feet. I am improving every day. ALONZO H. GALE.

A CURED DRUGGIST.

WICHITA, Kan., Oct. 29, 1882.

Last November I purchased a set of Wilsonia Magnetic Appliances. I had been a great sufferer from nervous prostration and rheumatism for ten years. I would be thrown into spasms every day, and sometimes three or four times a day. I have not had a hard spasm since, and for the last five months not a symptom of one. I can safely recommend them to any one suffering from nervous derangements or from rheumatism.

M. P. BARNES, Druggist.

WRITE FOR PARTICULARS. MENTION THIS PAPER.

WILSONIA MAGNETIC CLOTHING CO.,

NO. 25 EAST 14th ST., NEW YORK.

WESTERN ELECTRIC COMPANY.

CHICAGO, NEW YORK.

INDIANAPOLIS,

MANUFACTURERS OF

Telegraph Instruments and Supplies, Hotel and House Annunciators, Burglar Alarms and Call Bells, Electro-Mercurial Fire Alarm, Electric Gas-Lighting Apparatus, Magneto Call Bells, Telephone Exchange Switch Boards, etc.

UNDERGROUND AND AERIAL CABLES, AND TELEPHONE APPARATUS OF EVERY DESCRIPTION

CORRESPONDENCE SOLICITED.

JUST THE THING FOR

TELEGRAPH OPERATORS

AND EVERY ONE WHO WRITES.

The Perfect Stylographic Pen.

The finest fountain pen ever produced for rapid writing; never fails, never blots, can be carried in the pocket with safety, and will not break or get out of order.

Every Pen Warranted.

Price, with filler directions and ink, all complete, $2.

Sent by registered mail on receipt of price.

MONEY WILL BE RETURNED IN EVERY CASE IF NOT SATISFIED.

C. L. DOWNES, Manufacturer,
533 BROADWAY, N. Y.
FACTORY, NEWARK, N. J.

LECLANCHE BATTERY.

(PATENTED.)

PRISM BATTERY, COMPLETE.
Size of Jar 6 × 4¼ inches.

GREAT TELEPHONE BATTERY.

The Realization of
SIMPLICITY AND EFFICIENCY
In Electric Open Circuit Batteries.

Free from acid. Emits no odor. Does not get out of order. Lasts without renewal from six months to several years, according to use.

ADOPTED AND USED BY THE
American Bell Telephone Company.
Metropolitan Telephone and Telegraph Company.
Western Union Telegraph Company.
Gold and Stock Telegraph Company, with their battery telephones.
And by all the Telephone Companies and Exchanges in the United States.

The attention of the public is called to the new form of Leclanché Battery, in which the porous cell is dispensed with and for it substituted a pair of compressed Placques or Prisms, which are simply strapped to the Carbon (as shown in cut). The Prism Battery is more easily and cheaply cleaned and renewed than any other battery. Beware of **Infringements and Worthless Imitations.**

Every genuine Leclanche Battery has the words Pile-Leclanche stamped on the carbon head, jar and prisms. All others are spurious.

"Prisms" and Porous Cell Batteries for sale in any quantity. Zinc and Sal Ammoniac of superior quality.

The Leclanche Battery Co.
149 West 18th St., New York.

L. G. TILLOTSON & CO., Sole Agents,
Nos. 5 & 7 DEY STREET, N. Y.

COMPLETE SETS OF

MACHINERY

FOR THE MANUFACTURE OF

Telegraph Cables.

Wire Stranding Machines.

Complete sets of machinery for Purifying India Rubber and Gutta Percha, and Insulating Wire.

Lapping Machines for covering Wire with Silk, Cotton, Flax, Hemp, Tape, etc.

Thomas Barraclough & Co., Limited,
8 KING STREET,
Manchester, - - - England.

W. T. HENLEY'S TELEGRAPH WORKS COMPANY

(LIMITED),

Telegraph Engineers and Contractors
Wire Drawers and Galvanizers.

MANUFACTURERS OF

Submarine, Subterranean and Aerial Cables of every description, for Telegraph, Telephone and Electric Light Purposes.

Henley's Patent Ozokerited Core,

Henley's Patent Dynamo Machines and Electric Lamps.

Estimates for any kind of cables or core furnished.

OFFICE:
8 Draper's Gardens, Throgmorton Street,
LONDON, ENGLAND.

WORKS: North Woolwich.

AGENTS IN THE UNITED STATES,
Western Electric Co., New York Chicgo.

---

25 BOOTH ST. MANCHESTER. **WALTER T. GLOVER & Co** WORKS SALFORD

WIRE & CABLES OF EVERY DESCRIPTION FOR TELEGRAPHIC TELEPHONIC & ELECTRIC LIGHTING PURPOSES

LEADS & CABLES FOR

ELECTRIC LIGHTING.

WIRE & CABLES OF EVERY DESCRIPTION FOR TELEGRAPHIC TELEPHONIC & ELECTRIC LIGHTING PURPOSES

Contractors to the English Postal Telegraph Department, Many Prominent European Governments, the Principal British Railway, Telephone and Electric Light Companies.

Estimates promptly furnished for all kinds of covered Wires and Cables for Shipment to America, on which specially low rates will be quoted.

25 Booth St., MANCHESTER, - - ENGLAND.

RAMSDEN, CAMM & CO.,

BRIGHOUSE, YORKSHIRE, ENGLAND,

Iron and Steel Wire Drawers and Galvanizers

TRADE MARK — ROBIN HOOD — R&C° B.

MANUFACTURERS OF
PATENT TELEGRAPH WIRE,
Over 100-lb. Pieces Without Weld or Joint.
TO GOVERNMENT SPECIFICATIONS.
Best Refined Telephone Wire,
FENCING WIRE, SUBMARINE CABLE WIRE, STRAND AND STAY WIRE AND GALVANIZED BINDING WIRE.

Contractors to the English Postal Telegraph Department, Railway and Telephone Companies.

FREDERICK SMITH & CO.,

Caledonia Works, Halifax, England,

F S & Co TRADE MARK

MANUFACTURERS OF BEST PATENT
GALVANIZED TELEGRAPH AND TELEPHONE LINE WIRE,
Of High Conductivity, in 100-lb. Pieces, without Joint or Weld.
Iron and Steel Wire Drawers, Patent Galvanizers.
Cable Wire. Telegraph and Telephone Line Wire to all specifications. Best Galvanized Strand Wire. Iron and Steel Fencing Wire.
Patent Cast-Steel Rope Wire.
Galvanized Steel Wire for Long Spans.
Contractors to the English Postal Telegraph Department and Railway Companies.

PRIZE MEDALS—London, 1862; Paris, 1867; Moscow, 1872; Vienna, 1873; Paris, 1878; Philadelphia, 1876.

American Telegraph and Telephone Companies using wire in large quantities are invited to write for prices. Inquiries can be sent direct, or to THE ELECTRICAL SUPPLY COMPANY, 109 Liberty street, New York, sole agents for the sale of our telegraph and telephone line wire in the United States.

IMPORTANT TO TELEGRAPHERS.

THE KERNER STYLOGRAPHIC PEN.

A new invention, long needed by the telegraphic fraternity. Holds more ink, writes longer without refilling, writes better, never blots, never fails. Enables operators to copy close and neat. It is something every telegraph operator ought to have. The exceedingly low price at which the Kerner Stylographic Pen is sold puts within the reach of every person a first-class, durable and convenient writing instrument.

EVERY PEN WARRANTED.

We manufacture the following styles:

No. 1 Pen, plain	**$1.00**	**No. 3, gold mounted**	**$1.50**
No. 2, engraved	**1.25**	**No. 4, entire gold cap**	**3.00**

Any of the above sent post-paid on receipt of price. Enclose 10c. for registration.

THE KERNER STYLOGRAPHIC PEN CO., 59 and 61 LIBERTY ST., NEW YORK.

BOSTON
Electric Company,

550 Washington Street,

BOSTON, MASS.,

MANUFACTURERS AND DEALERS IN

ELECTRIC SUPPLIES,

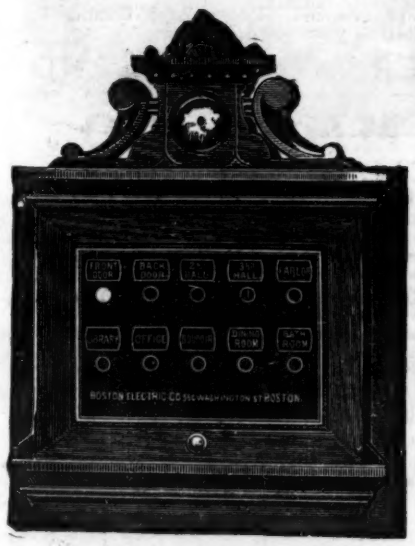
Electric Gas Lighting Apparatus,

ELECTRIC BELLS,

BURGLAR ALARMS,

Electric Light Supplies, Telegraph Supplies,

TELEPHONE SUPPLIES, Etc.



HOTEL AND HOUSE

ANNUNCIATORS.

Elegant in Design, Style and Finish.

LINE SUPPLIES,

AT BOTTOM PRICES.

Batteries of all kinds,

Battery Supplies,

Galvanized Iron Wire,

Galvanized Steel Wire,

Screw Glass Insulators,

Porcelain Insulators,

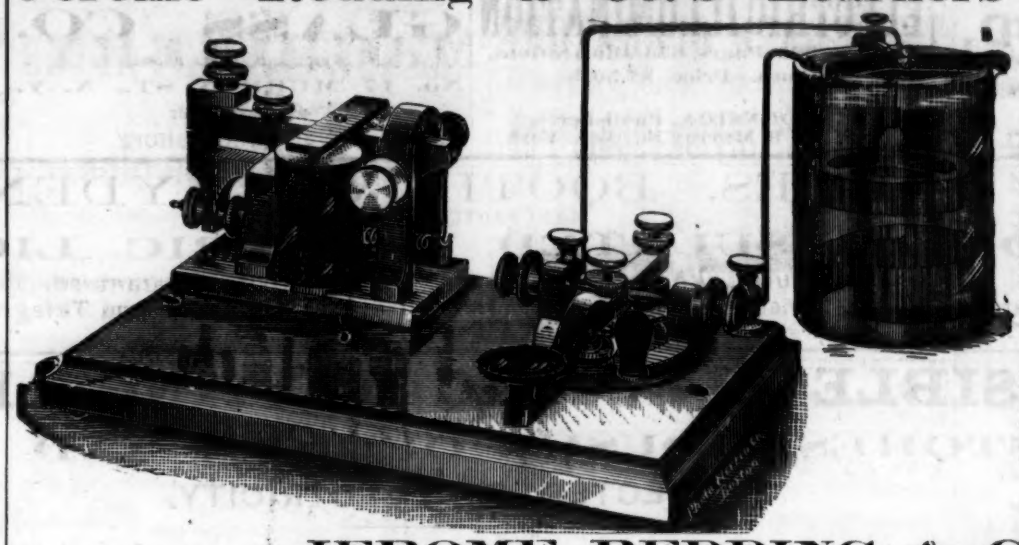
Rubber Hooks,

Brackets and Pins,

and Chemicals.

SEND FOR CATALOGUE.

Jerome Redding & Co.'s Learners' Instrument.



Price for the Complete

"GEM" LEARNERS' OUTFIT,

$3.75.

Consisting of the above large-sized Sounder and Key, a large Cell of Callaud Battery, one roll of Office Wire, Book of Instructions, Chemicals, etc.

The only low-priced Learners' Instrument that has nicely finished BRASS *Sounder and Key Lever, with perfect adjustments for both.*

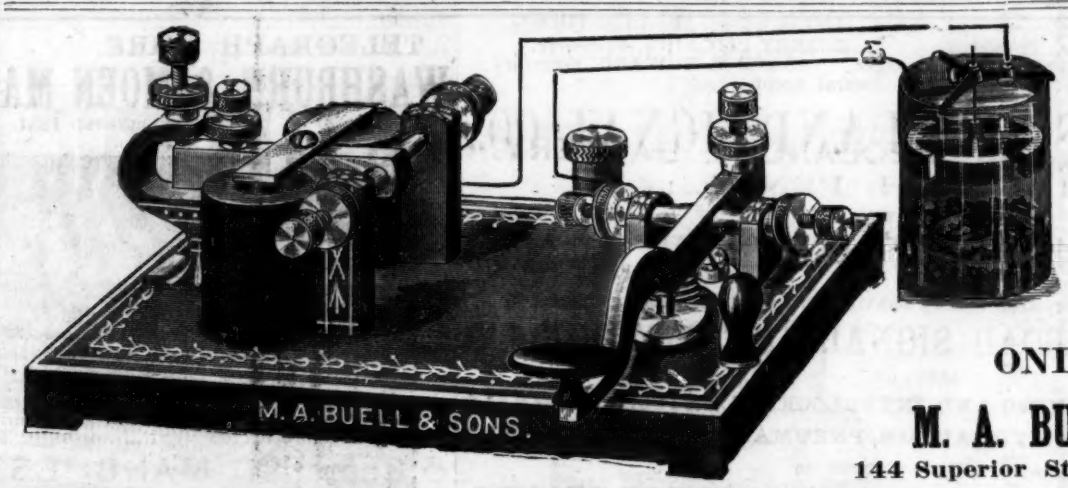
Price for Complete Outfit	$3.75
Price for Instrument alone	3.00
Price for the whole outfit (except Glass Jar), with Key and Sounder separate, by mail, post-paid	4.33
Price for Instrument alone, by mail, post-paid	3.60
Price for Instrument alone, for lines 1 to 15 miles	3.60
Price for Instrument alone, for lines 1 to 15 miles, by mail, post-paid	4.05

SEND FOR CIRCULAR.

JEROME REDDING & CO.,

MANUFACTURERS OF TELEGRAPH AND ELECTRICAL SUPPLIES,

NO. 30 HANOVER STREET, BOSTON, MASS.



THE STAR INSTRUMENT

Guaranteed to be Perfect and Good for 5 miles or less.

Instrument, without battery, wound with fine wire	$3.25
The Instrument, by mail	3.50
" " wound with fine wire	3.75
Outfit, including wire, vitriol, and book	3.50
Outfit, wound with fine wire	3.75
Instrument, without battery	3.00

ONLY $3.50.

M. A. BUELL & SONS,

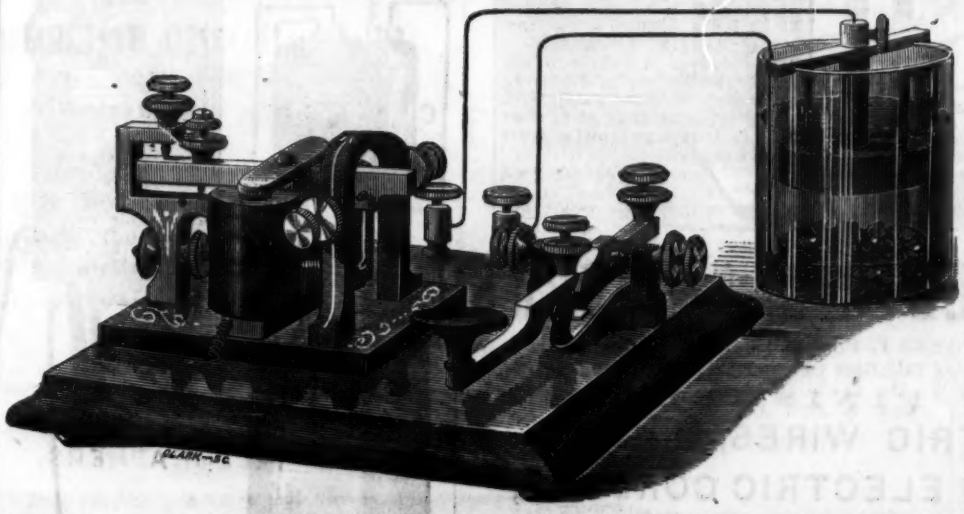
144 Superior Street, Cleveland, Ohio.

JOHN A. ROEBLING SONS CO.
MANUFACTURERS OF
TELEPHONE
AND
TELEGRAPH WIRE
WORKS AT TRENTON, N.J.
ALL KINDS WITH THE HIGHEST ELECTRICAL CONDUCTIVITY
OFFICE & WAREHOUSE 117 & 119 LIBERTY ST NEW YORK.

The Works of the JNO. A. ROEBLING SONS CO., at Trenton, N. J., have facilities for producing large quantities of Telegraph Wire on short notice. The Belgian system of rolling long lengths of wire rods, and improved methods of galvanizing, were first introduced in the United States at these works. It insures the production of wire with few joints and with a thick coating of zinc.

PREMIUM LEARNERS' APPARATUS. ONLY $5.

NOT THE CHEAPEST, BUT GUARANTEED THE BEST.



The PREMIUM LEARNERS' APPARATUS AND OUTFIT comprises the famous "NEW GIANT SOUNDER PERFECTED," and the "NEW CURVED KEY," placed upon a splendidly polished base, with a cell of Callaud Battery, Chemicals, Office Wire, and an excellent Book of Instruction, for $5, when the money accompanies the order.

These instruments are the exact size and form of those upon which we received the highest award at the late Centennial Exhibition over all competitors. Everything reliable, and so guaranteed, or money refunded. Our book of instruction contains full and explicit information as to setting up the battery, running of wires, &c.

Price, Complete Outfit.....$5.00. **Instrument without Battery ..... $4.20.**

Instruments wound with finer wires for lines of one to 15 miles, $5.00; Cell of Battery, Complete, 80 cents; Premium Sounder, Separate Base, $2.50; Premium Key, Separate Base, $1.75; Premium Learners' Instrument, Key and Sounder entirely Nickel-plated, without battery, $5.20 Complete Nickel-plated Instrument, with battery and outfit, $6.00; Sounder, separate base, $3.25; Key, $2.00. Money in advance.

Instruments without battery, sent by mail, 55 cents extra. Battery jars cannot be sent by mail. All orders will receive our prompt and careful attention. To prevent delay in shipment, full shipping instructions with town, county and State, should be given. Remittances should be made by P. O. money order, registered letter, draft or express, which will insure safe delivery. Send for catalogues and circulars before purchasing elsewhere.

PARTRICK & CARTER,

MANUFACTURERS OF TELEGRAPH INSTRUMENTS AND SUPPLIES,

No. 114 South Second Street, Philadelphia,

HALBERT E. PAINE, Late Commissioner of Patents. STORY B. LADD.

PAINE & LADD,

SOLICITORS OF PATENTS & ATTORNEYS IN PATENT CASES.

Washington, D. C.

Just Published!

ELECTRIC ILLUMINATION

Quarto, 900 Pages, 833 Illustrations.
Cloth. Price $7.50.
Address,
W. J. JOHNSTON, Publisher.
No. 9 Murray St., New York.

BOSTON AND SANDWICH

GLASS CO.

OFFICE AND SAMPLE ROOMS,
No. 17 MURRAY ST., N. Y.
REPRESENTED BY
C. E. L. BRINKERHOFF.

SAM'L CRAWFORD. JOS. E. CRAWFORD.

E. CRAWFORD'S SONS,

Fire Insurance,

MOUNT VERNON, N. Y.,
Representing eight Fire Insurance Companies, and the "Travelers," of Hartford, Conn.

HOLMES, BOOTH & HAYDENS,

MANUFACTURERS OF

FIREPROOF INSULATED ELECTRIC LIGHT WIRE

From Pure Lake Superior Copper. Conductivity Guaranteed.
Patent "K. K." Insulated Copper and Iron Wire, for Telephone and Telegraph Use.
49 CHAMBERS ST., N. Y. WORKS: WATERBURY, CONN. 18 FEDERAL ST., BOSTON.

INVISIBLE ELECTRIC MATTING ALARMS.

BANKS, STORES, HOUSES, OFFICES AND FACTORIES

PROTECTED BY ELECTRICITY.

The basis of this system consists of an *Electric Matting* placed under the carpet, rug, or other floor covering, which when trod upon or touched by the foot sounds instantly an alarm or signal in any desired portion of the building, or outside the same, at any distance near or remote. *Invaluable for Domestic Service* and *Business Convenience* as well as *security* against *Burglars* or *Fire*. Introduced on *very reasonable rental* and cared for without extra charge. Address the General Commercial Offices.

APPLEGATE ELECTRIC ALARM MATTING CO., *Mills Building, N.Y. City*, or *Offices* of Sub-Companies, in Philadelphia, at 335 Chestnut St.; Baltimore, 14 South Charles St.; Cincinnati, 82 W. 3d St. and in Chicago, 168 Dearborn St. Agents Wanted.

GEORGE WESTINGHOUSE, Jr., President. ROBERT PITCAIRN, Treasurer.
C. H. JACKSON, Vice President and General Manager. ASAPH T. ROWAND, Secretary.
HENRY SNYDER, General Agent.

THE UNION SWITCH AND SIGNAL CO.,

PITTSBURGH, PENNA.,

A CONSOLIDATION OF

THE UNION ELECTRIC SIGNAL CO., AND OF THE INTERLOCKING SWITCH & SIGNAL CO.
Of Boston, Mass. Of Harrisburg, Pa.

SOLE OWNERS AND MANUFACTURERS OF THE ONLY PRACTICALLY SUCCESSFUL SYSTEM OF

OPERATING RAILROAD SIGNALS AUTOMATICALLY.

ALSO OF

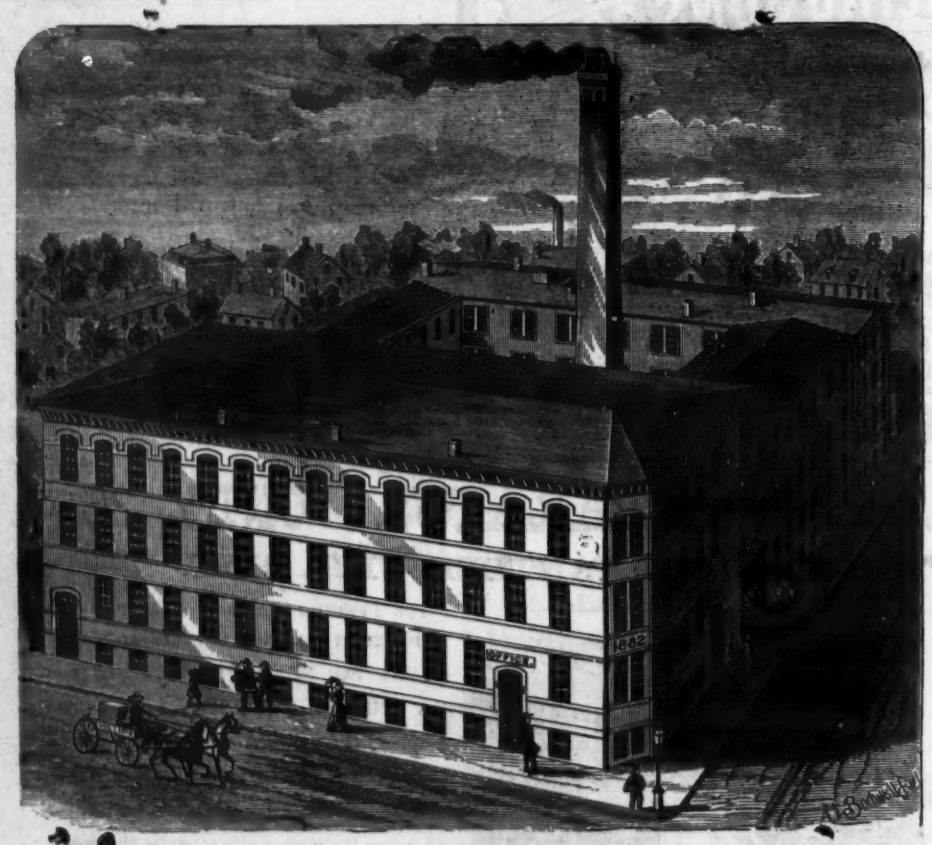
APPARATUS FOR OPERATING AND INTERLOCKING SWITCHES, SIGNALS AND GATES BY LEVERS, HYDRAULICS, PNEUMATICS OR ELECTRICITY.

ALSO MANUFACTURERS OF

FROGS, CROSSINGS, SWITCHES AND SWITCH STANDS.

☞ Plans, estimates and detailed descriptions, together with references to apparatus in practical operation, will be furnished upon application.

Office and Works, Corner Fayette Street, Garrison Alley and Duquesne Way.



AMERICAN ELECTRICAL WORKS

(Formerly EUGENE F. PHILLIPS),
MANUFACTURERS OF

PATENT FINISHED

INSULATED ELECTRIC WIRES,

TELEPHONE AND ELECTRIC CORDAGE,

ELECTRIC LIGHT WIRE.

Magnet Wire, Patent Rubber-Covered Wire, Burglar Alarm and Annunciator Wire, Lead-Encased Wire; Anti-Induction Aerial and Underground Cables, etc., etc.

Office and Factory, 67 Stewart Street, Providence, R. I.

EUGENE F. PHILLIPS, President. W. H SAWYER, Secretary and Electrician.

TELEGRAPH WIRE. TELEPHONE WIRE.

WASHBURN & MOEN MANUFACTURING COMPANY.

ESTABLISHED 1831. CAPITAL $1,500,000.

WORCESTER, MASS.

16 Cliff and 241 Pearl Streets, New York. 215 Lake Street, Chicago.

This Company having given careful attention to Telegraph Wire from the introduction of the Art of Telegraphy, and especially with reference to the conditions necessary to *highest electric conductivity*, does not hesitate to recommend this class of its products as unequaled in that particular. Being the first to

MAKE A SPECIALTY OF TELEGRAPH WIRE,

and anticipating at an early day the great demand that would exist for that article, they have adopted and fully proved certain methods and appliances for the production of Telegraph as well as of Telephone Wire which are peculiar to themselves. Among them may be mentioned the

PATENT CONTINUOUS ROLLING MILL, PATENT CONTINUOUS GALVANIZING BATH, AND THE BELGIAN ROLLING MILL.

(In connection with the DOUBLE SIEMENS FURNACE).

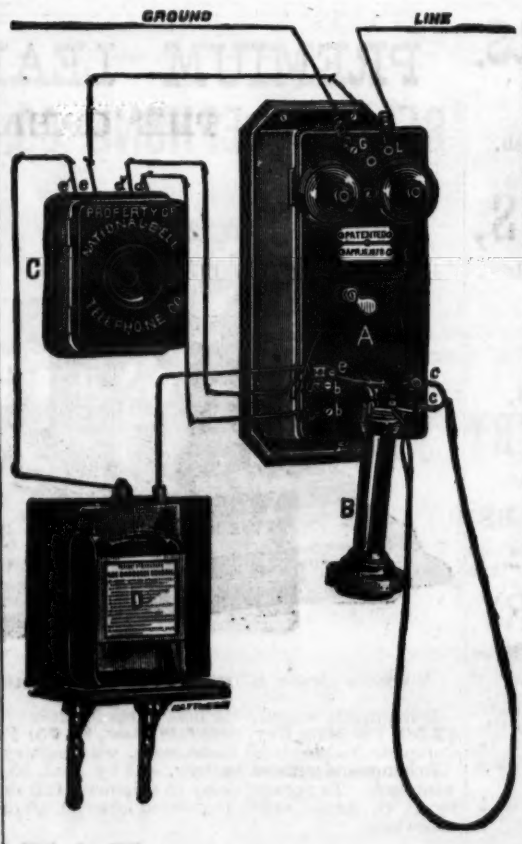
All Wire made by this Company for Telegraph or Telephone purposes is thoroughly tested before shipping, with regard to Conductivity, Tensile and Torsion strength, as well as Elongation.

Prices and terms for Telegraph or Telephone Wire—Plain, Oiled or Galvanized—given upon application.

N. B.—The qualities known as extra Best (E. B. B.) and Best Best (B. B.) kept constantly in stock

THE AMERICAN BELL TELEPHONE COMPANY.

W. H. FORBES, President. W. R. DRIVER Treasurer. THEO. N. VAIL, General Manager.



This Company, owning the Original Patents of Alexander Graham Bell for the Electric Speaking Telephone, and other patents covering improvements upon the same, and controlling, except for certain limited territory, under an arrangement with the Western Union Telegraph Company, the Gold and Stock Telegraph Company, the American Speaking Telephone Company, and the Harmonic Telegraph Company, the patents owned by those companies, is now prepared to furnish, upon application, either directly or through any of its agents, Telephones of different styles, and applicable to a variety of uses.

This company desires to arrange with persons of responsibility for establishing

District or Exchange Systems,

in all unoccupied territory, similar to those now in operation in all the principal cities in this country.

Responsible and energetic persons are required to act as licensees for the purpose of establishing

PRIVATE LINE AND CLUB LINE

systems, for business or social uses. Also to introduce the telephone for

SPEAKING TUBE

purposes, for which instruments will be leased for a term of years at a nominal rental.

This Company will arrange for telephone lines between cities and towns where Exchange systems already exist, in order to afford facilities for personal communication between subscribers or customers of such systems.

We respectfully invite attention to this matter, and any further information relating thereto can be obtained from the Company,

No. 95 Milk Street, Boston, Mass.

All persons using Telephones not licensed by this Company are hereby respectfully notified that they are liable to prosecution, and for damages for infringement, and will be prosecuted accordingly to the full extent of the law.

DAY'S

KERITE INSULATED

Telegraph, Telephone and Electric Light

WIRES AND CABLES,

MANUFACTURED ONLY BY THE INVENTOR,

AUSTIN GOODYEAR DAY,

OFFICE: 120 BROADWAY, NEW YORK.

FACTORY: SEYMOUR, CONN.

KERITE INSULATION should be used on electrical conductors for any of the following purposes:

Submarine, Underground or Aerial Telegraph, Telephone and Electric Light Cables; Office Cables and Lines; also for Battery, Burglar Alarm, Fire Alarm, Police and Submarine Blasting Purposes,

or for any other operation which requires perfect, indestructible and permanent insulation of electric wires.

A large number of

ANTI-INDUCTION KERITE TELEPHONE CABLES,

some of them TWO MILES IN LENGTH, are in use in several cities, and are found to WORK PERFECTLY for that distance.

Kerite is recommended and indorsed by all leading men connected with telegraphy, telephony, and electric lighting.

At the CENTENNIAL EXHIBITION at Philadelphia, Sir WILLIAM THOMSON, the eminent Electrician and Scientist, awarded to the

Kerite Insulated Wire and Cables

A DIPLOMA

For "Excellence of the Insulation and Durability of the Insulator."

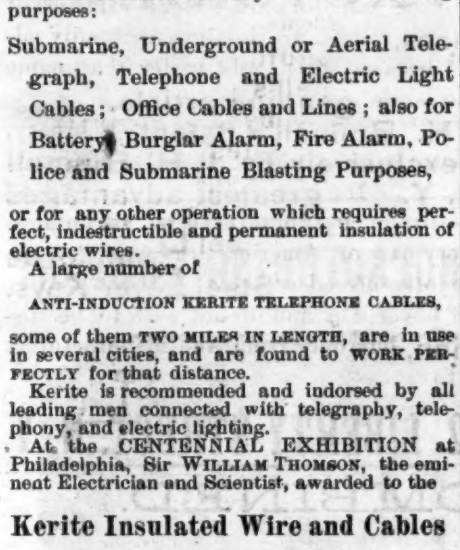
For Sale by all Dealers in Telegraphic Materials.

CLARK B. HOTCHKISS, Gen. Agt.

120 Broadway, New York.

THE

LAW BATTERY



SIZE OVER ALL, 7¼ × 4¼ INCHES.

PATENTED.

THE BEST

OPEN CIRCUIT BATTERY

in every respect, without any question.

SUPPLANTING ALL OTHERS!

With its introduction, Battery Trouble and Battery Expense become things of the past. As a

TELEPHONE BATTERY,

the LAW unquestionably excels all others. Now almost universally used by the Telephone Exchanges of the whole country.

The materials used in its construction are the very best. No acids. No odors. Great recuperative power. Nothing to renew except the zinc and sal ammoniac; no porous cup, placque or prism. Fits the standard size battery-box.

Send for Circular and Schedule of Prices.

Single Cells, $1.25.

Manufactured and for sale by the

LAW TELEGRAPH COMPANY

140 Fulton Street, New York.

WILLIAM A. CHILDS, Manager.

FRANK SHAW, Engineer.

THE BISHOP

GUTTA-PERCHA WORKS.

ESTABLISHED IN 1847.

SAMUEL BOARDMAN, Agent.

Original and only Manufacturers in North America of

PURE GUTTA-PERCHA INSULATED,

SUBMARINE, SUBTERRANEAN AND AERIAL TELEGRAPH, TELEPHONE AND ELECTRICAL WIRES AND CABLES OF EVERY DESCRIPTION.

Sole Licensees under the Simpson patent for the manufacture of Gutta-Percha Insulated Wires. Have constantly on hand and make to order

GUTTA-PERCHA AND BALATA INSULATED WIRES FOR ALL ELECTRICAL PURPOSES, MARKS' COMPOUND INSULATED WIRES,

FOR OFFICE, AERIAL, UNDERGROUND AND BATTERY USES.

Also, every variety of Compressed Electrical Cordage—Burglar Alarm, Call Bell and Annunciator Wires—Electric Light and Gas Lighting Wires and Cables—Silk, Cotton and Fibre-covered Copper Magnet Wires and German Silver Resistance Wires—Medical, Switch and Telephone Cords—Flexible Elevator Cables, etc., G. P. Sheet for Cable Splices, and every description of pure

GUTTA-PERCHA GOODS.

OUR GOODS ARE FOR SALE BY

L. G. TILLOTSON & CO.,

5 and 7 Dey Street, New York.

Send for Catalogue.

ADDRESS COMMUNICATIONS:

W. W. MARKS, Supt.,

420, 422, 424, 426 East Twenty-fifth St.,

Office at the Works. NEW YORK CITY.

CHARLES WILLIAMS, JR.

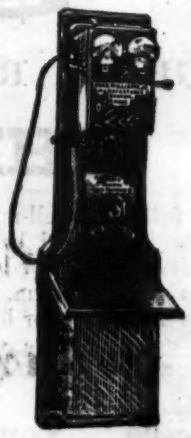
(ESTABLISHED IN 1856),

109 Court Street, Boston, Mass.,

AUTHORIZED MANUFACTURER OF

THE AMERICAN

BELL TELEPHONE CO.



Magneto, Crank and Push Button Call Bells, Electric Bells, District Bells and Switches for Exchanges, Annunciators, etc.

Telegraph and Electrical Instruments, Batteries, Wire, Insulators, and Telephone Supplies of every Description.

ENGLISH

Patent Office.

H. GARDNER,

166 Fleet St., London.

Successor to

Messrs. Robertson, Brooman & Co.

Gives prompt personal attention, and obtains Patents for Inventions, Protection for Trade Marks, etc., at fixed and moderate charges. Pamphlet of costs gratis.

Thirty years' practical experience.

Provisional Protection, £8

JOHN TURNER, President. JOHN P. LORING, Sec. and Treas

THE

CENTRAL AMERICAN

TELEGRAPH & TELEPHONE CO.

CAPITAL STOCK $100,000.

Shares $10 each. Full paid and non-assessable.

This Company has acquired and *owns all* the telephonic rights formerly the property of the American Bell Telephone Company, Continental Telephone Company and The Tropical American Telephone Company, Limited, in **Central America and Panama.**

The Company **BUYS** its telephones and transmitters, and thereby avoids paying Royalties.

A limited number of the shares of the stock is offered for sale at $5 per share.

Address

JOHN P. LORING, Treasurer,

Sears Building, Boston, Mass.

DELANO & HAINES,

Promoters and Brokers,

TEMPLE COURT,

5 BEEKMAN ST., N. Y.

EXECUTIVE OFFICERS OF THE

MEXICAN TELEPHONE CO., AND THE TROPICAL AMERICAN TELEPHONE CO., LIMITED.

These companies have acquired and own, in their respective territories, all the telephonic rights formerly the property of the Continental Telephone Co., including the *exclusive right*, for a term of years, of selling, leasing, and using Bell Telephones, Blake Transmitters, and all other telephonic apparatus manufactured by the AMERICAN BELL TELEPHONE CO., under patents owned or controlled by it in the United States and Canada.

VALUABLE TELEPHONE TERRITORY

Can be had by parties who can furnish the money requisite to develop it, in the Republic of **Mexico, the West India Islands, and South America.**

TELEPHONE AND ELECTRICAL

STOCKS

BOUGHT AND SOLD.

THE

Faure Accumulators,

OR

ELECTRIC

Storage Batteries.

The Heretofore Missing Link

IN

ELECTRIC LIGHTING.

No Machinery of any Kind Required on or Near the Premises.

The light produced from these batteries is always ABSOLUTELY STEADY and pure, and free from the FLICKER or PULSATION that is apparent in every light coming direct from a dynamo.

The consumer is *free from the uncertainty of steam power*, and the liability of all kinds of machinery to *stop* at the most inopportune moment. These batteries enable a *vast saving of money*, both in introducing and in after use, besides affording *heretofore* unknown comfort in the use of electricity.

They are Applicable for Power as well as Light.

For the privilege to *organize companies* under this patent, or for the purposes of *isolated use* in any of the following states:

Virginia,	Georgia,
North Carolina,	Florida,
South Carolina,	Texas,
Alabama,	Louisiana,
Mississippi,	

APPLICATION MAY BE MADE TO

DAVIS & PROAL,

BALTIMORE, Md.,

ROOMS 29 AND 31,

Chamber of Commerce Building,

who are the managers for the Parent Company, in the above named States, and who are prepared in its name to *issue licenses.*

They will be pleased to give any information regarding the system.

The batteries are in practical use in the Chamber of Commerce Building, and in our offices, where the entire working of the system can be seen and explained.

All communications will have immediate attention.

AUGUSTUS G. DAVIS.

A. B. PROAL.

PHOSPHOR-BRONZE TELEPHONE WIRE.

"Phosphor-Bronze."

The STRONGEST, TOUGHEST and BEST for line wires of electric and acoustic telephones. Will not STRETCH nor RUST. RESISTS SMOKE, ACIDS and DAMPNESS. TENACITY more than FOUR times its weight per mile.

PHOSPHOR-BRONZE RODS, SPRING METAL AND WIRE,

superior to German silver or brass for electrical apparatus. Already extensively used throughout the country. Address

THE PHOSPHOR-BRONZE SMELTING CO., LIMITED,
512 ARCH ST., PHILADELPHIA, PA.

Owners of the U. S. Phosphor-Bronze Patents. Sole Manufacturers of Phosphor-Bronze in the United States.

FREE TO YOU

By Mail, on receipt of 25c. in currency or stamps. **HOW TO BECOME A TELEGRAPH OPERATOR.** The most complete illustrated Telegraph Instruction Book in the world.

C. E. Jones & Bro.: Dear Sirs:—Instruction Book received O. K., and many thanks. It is worth five times what it cost. If a person could not learn to be an operator after studying it, THEY HAD BETTER GIVE UP. Yours truly,
A. L. JAMES, Tipton, Tulare County, Cal.

NOW! RIGHT! NOW! while fresh in your mind, is the best time to send your order, before you misplace this paper and forget our address, and your opportunity is gone.

C. E. JONES & BRO., MANUFACTURERS AND DEALERS IN **Telegraph, Telephone and Electrical Supplies,**
No. 51 West Fourth Street, CINCINNATI, O.

J. H. LONGSTREET,

No. 9 Barclay Street,

NEW YORK,

MANUFACTURER AND DEALER IN

TELEGRAPH INSTRUMENTS,

Telephone and Telegraph Supplies

OF EVERY DESCRIPTION,

ANNUNCIATORS AND BURGLAR ALARM APPARATUS, BATTERIES AND BATTERY MATERIAL.

Telegraph Instruments for Railroad Use a Specialty.

INVENTORS' AGENCY,

FOR THE

Patenting, Introduction and Sale of

INVENTIONS.

Those Relating to Electricity a Specialty.

Patent specifications for electrical or other inventions drawn. Information given as to whether inventions are patentable or not.

Excellent facilities for placing inventions of merit, especially electrical inventions.

Opportunities constantly offered for profitable investments in patents, and chances to secure large interest in several new inventions by furnishing means to take out patents.

List of important patents now for sale forwarded on application, or shown and explained at the office.

KNUDSON ELECTRICAL COMPANY
(LIMITED).
39 NASSAU STREET,
New York.

STEEL LEVER KEYS.

The best proof of the real merit of the **Steel Lever Key** is to be seen in the promptness with which the **imitators** come to the front. The **great success** of this invention has caused to be put forward several varieties of **absurd and inferior contrivances,** which are in all cases loudly advertised as **"Steel Lever Keys,"** because when sold under that name many persons will buy, believing them to be the **genuine article.**

The genuine Steel Lever Key, **J. H. Bunnell's patent,** February, 1881, is manufactured **solely and exclusively by J. H. Bunnell & Co., 112 Liberty street, N. Y.** Its **greatest advantages in construction** are covered by the patent, and these especial advantages which have made this key popular in every part of America are **not to be found** in any of the poor imitations urgently offered as **Steel Lever Keys.** Therefore, if you want the genuine Steel Lever Key and do not wish to be disappointed with a **worthless imitation,** buy only from the manufacturers direct. All orders should be addressed to

J. H. BUNNELL & CO., 112 LIBERTY STREET, N. Y.

PERFECTION AND ECONOMY COMBINED.

We have Several Hundred Second-Hand

Magneto Bells,

with telephone connections removed. These will work over any length of line and give a clear, loud sound. **No Battery required.** They, moreover, have the advantage of enabling you to signal back. They can be put up with less trouble than battery bells, and are always absolutely reliable. Invaluable for stable purposes, large factories, stores and any other places where it is often necessary to summon employés from a distance. **Price, $4.00 each.** A liberal discount allowed on large lots.

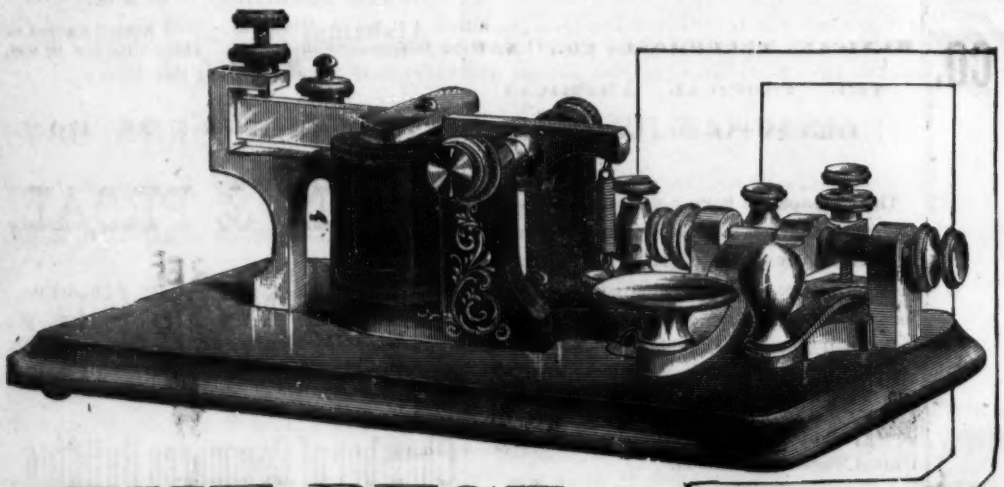
PRINCE OF LEARNERS.

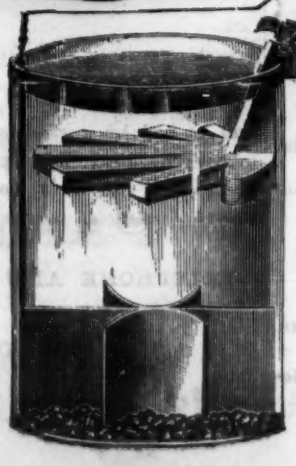
The above beautiful outfit we unhesitatingly claim to be the best, at or near the price, in the market. A full-size sounder of great capacity and clearness of tone, curved lever key of improved construction, the whole substantially made and finished in best style, and mounted on a highly polished mahogany base. We make two styles. No. 1 is fitted with *highly polished brass* sounder and key levers and *hard platina points.* No. 2 has bronzed iron levers, and is presented to meet the views of those who desire a cheaper instrument, the same as supplied by other manufacturers. The Battery is of extraordinary power and constancy. We guarantee this outfit to be all we claim, and will return the money where satisfaction is not met with. Outfit includes chemicals, office wire and book of instruction.

PRICE:

Complete outfit, No. 1	$4.30
" " No. 2	3.70
Instrument alone, No. 1	3.50
" " No. 2	2.90
Battery	.65
Instrument wound with finer wire for long circuits	4.25
Galvanized wire, ¼ mile	3.90
Instrument alone, by mail, anywhere in U. S., post-paid	4.00
" " when wound with fine wire, "	4.75

DAVIS & WATTS, Baltimore, Md.





THE BEST.

Price, $3.75, complete with Battery, Book of Instruction, Wire, Chemicals, and all necessary materials for operating.

"Morse" instrument alone, without battery	$3.00
"Morse" instrument, without battery, and wound with fine wire for lines of one to fifteen miles	3.75
Cell of battery complete	.65
"Morse" Learners' Instrument, without battery, sent by mail	3.50

(Battery cannot be sent by mail.)

Instruction Book FREE.

Goods sent C. O. D. to all points if one-third of the amount of the bill is sent with the order.
Remit by Draft, Postal Money Order, or Registered Letter.
Favorable arrangements made with Agents everywhere.

The "Morse" Learners' Outfit.

$3.75.

GREAT REDUCTION IN PRICE!!!

THE "MORSE"

Is a full-size, well-made, complete MORSE TELEGRAPH apparatus of the latest and best form for learners, including handsome Giant Sounder and Curved Key, and a large Cell of the best Gravity Battery, latest form. It is the best working set of Learners' Instruments for short or long lines, from a few feet up to 20 miles in length,

YET OFFERED!

You are SURE of Getting

THE BEST THAT IS MADE

IF YOU SELECT THE "MORSE."

We will in every case refund any remittance made us for these goods if they are not found to be Entirely Satisfactory.

J. H. BUNNELL & CO.,

112 LIBERTY ST., NEW YORK.

JEROME REDDING & CO.,

30 HANOVER ST., BOSTON, MASS.

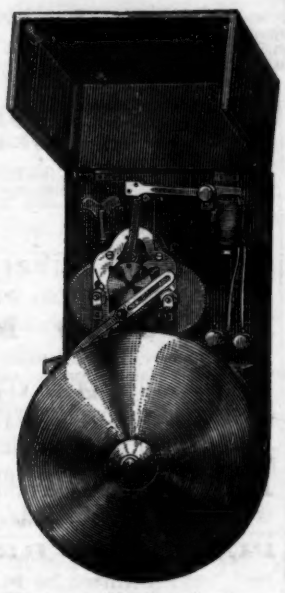
ELECTRIC GAS-LIGHTING APPARATUS,

ANNUNCIATORS, WATCH CLOCKS,

AND ALL ELECTRIC BELL SUPPLIES.

AUTOMATIC BURGLAR ALARM INDICATOR.

This Burglar Alarm is furnished with a nicely polished case of black walnut or any other wood desired. It has a five-inch gong mounted on an iron frame. The gong, switches and all other brass work, nickel plated.



Electro-Mechanical or Striking Gong.

This Gong is operated by a spring, and strikes three hundred blows at one winding. It is absolutely certain in operation, requires but little battery power, strikes a hard blow and is sold at a very low price.

Send a stamp for a copy of our new book, just issued, containing information in regard to

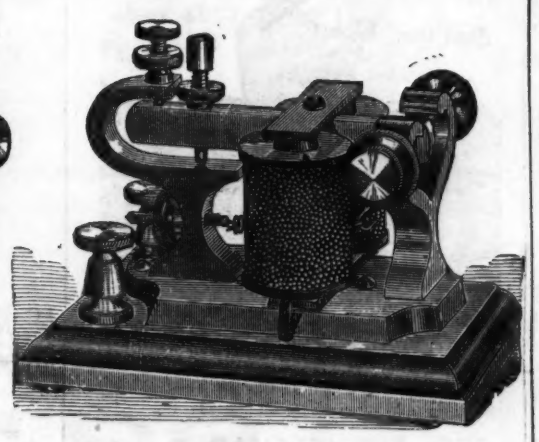
Electric Bells, Annunciators and Gas-Lighting Apparatus,

with full instructions for putting up and maintaining them, and diagrams showing how to run the wires; also a complete price list.

THE O. K. LEARNERS' OUTFIT

NO. 2 O. K. KEY.

The above Key is a perfect working key, and has *pure platinum points.* Price, $1.45, C. O. D., subject to inspection.



NO. 2 O. K. SOUNDER.

The above Sounder is warranted to work well where any sounder will. Price, $2.60, C. O. D., with privilege to examine before paying for it.

NO. 2 O. K. COMPLETE LEARNERS' OUTFIT.

The above Sounder and Key (either on one base or separate, as ordered), one full-sized Callaud battery, 1 lb. vitriol, 15 ft. office wire, book of instructions, all nicely packed and sent C. O. D., **$4.50,** with privilege to examine before paying for them.

These instruments are neat in appearance, strong and durable. The bases of the key and sounder are iron, japanned, and nicely ornamented with gold leaf. The levers are iron, bronzed, and look as well as brass All the screws, check-nuts, binding-posts, etc., are of brass, nicely finished. The contact points in the key are *pure platinum.* The sounder magnets are full size, and wound to work on a line from a few feet to 10 miles without relay.

If you want cheaper instruments, send for my reduced catalogue and instruction book, free of charge. Will fill all orders the same day I receive them. Address, mentioning THE OPERATOR,

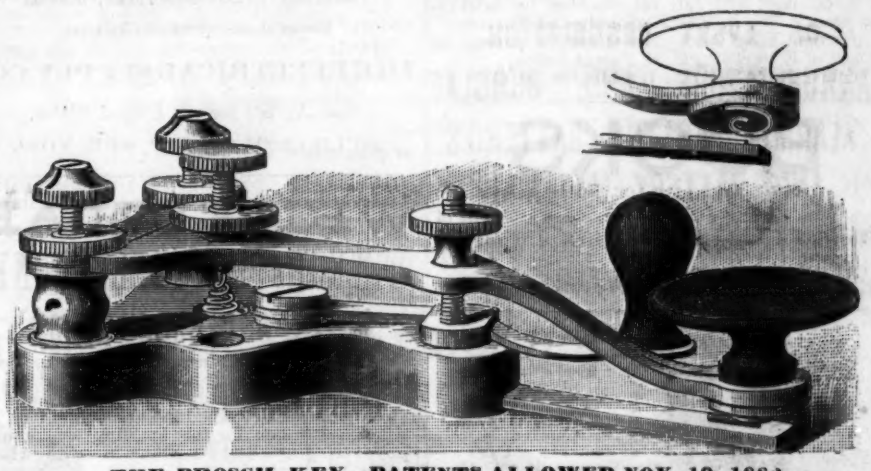
A. B. LYMAN,

39 SOUTH WATER STREET, - - CLEVELAND, O.

THE ELECTRICAL SUPPLY COMPANY.

LEARNER'S OUTFIT; PRICE, $3.50

Full size Key and Sounder mounted on polished Mahogany base, Battery, Chemicals, Wire, Book of Instructions, everything necessary for operating. For private practice, or on short service line. **NO. 1 OUTFIT**—Complete with book, packed in a light wood box, **$3.50,**



THE PROSCH KEY.—PATENTS ALLOWED NOV. 19, 1882.

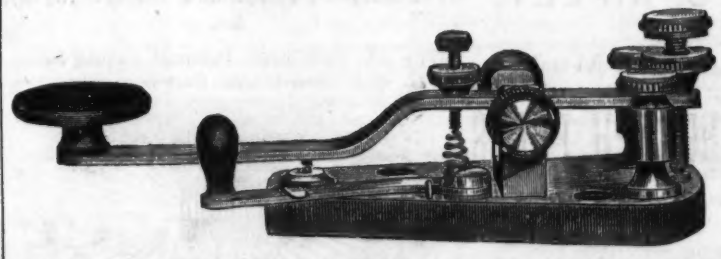
Is thoroughly practical in every detail, and combines every desirable feature required to insure easy, rapid and perfect work, with no delays consequent from sticking and the necessity of cleaning contacts and changing various adjustments to overcome it. It is absolutely **A NON-STICKER and EASY WORKER.** No trunnions or parts to bind.

PRICE METAL BASE TOP CONNECTIONS $3.50.

Send for our Price List of Telegraph Instruments, containing full description of the PROSCH KEY and the LEARNER'S OUTFIT as well as other instruments and supplies.

ELECTRICAL SUPPLY CO., 109 Liberty Street, New York.

THE ACME STEEL LEVER KEY.



Price, by mail to all parts of the United States and Canada, $3.

HARD RUBBER BASE, TOP CONNECTIONS, NICKEL PLATED.

The Acme Steel Lever Key is fast replacing all other styles of Morse Keys, and is now known as the *best* and *most perfect key* ever placed before the telegraphic profession. Thousands are in use, and we have yet to hear of the first instance where they have not given entire satisfaction.

READ WHAT PRACTICAL TELEGRAPHERS SAY!

"Unequaled by any other key." W. H. C. Hargrave, C. L. Laverty, W. N. Gove, Joseph Christie, Joseph T. Wilde, Associated Press, Philadelphia.

"Gives perfect satisfaction, especially during fast writing, as it will not stick." H. H. Hamilton, chief operator P. & N. Y. C. R. R., Sayre, Pa.

"Best and easiest working key I ever used." Charles R. Norman, Chester Oil Co., Philadelphia.

"More than pleased with it, best and neatest key I ever saw." J. F. Book, agent O. C. R. R., Luckey, O. "Well worthy of the name, and you deserve the patronage of telegraphers for supplying a great want." W. S. Burleigh, C. J. Waters, B. F. Reilly, Philadelphia Stock Exchange.

"A good and perfect key." J. D. Maize, with Drexel & Co., Philadelphia.

"Neatest and prettiest key I ever handled." F. M. Saunders, T. C. & St. L. R. R., Wilshire, O.

"Am highly pleased with it." A. J. Scott, Pecatonica, Ill.

"It cannot be beat." J. A. McKillip, C., C., C. & I. R. R., Catawba, Ohio.

"Well adapted for fast sending and refuses to stick." C. Kammeyer, Fire Alarm Office, St. Louis, Mo.

"A first-class key in every way. We prefer it to any other key and regard it as perfect." T. W. Bair, A. W. Ford, A. G. Taylor, E. B. Saylor, Perry Chamberlain, D. F. Crean, C. H. McConnell, W. M. Higbee, E. W. H. Cogley, Thomas Tibbitts, Western Union Telegraph, Phila.

The above are a few of the hundreds of testimonials received. Send for catalogues and circulars.

PARTRICK & CARTER,

Manufacturers and Dealers in Telegraph, Telephone and Electrical Instruments.

SUPPLIES OF EVERY DESCRIPTION.

No. 114 South Second Street, Philadelphia.

SHORTHAND BY MAIL.

No Misstatements. One Course. Satisfaction Guaranteed in every respect. Send 10 cents for specimens and terms. RALPH B. CLARKE, Stenographer, 17 Bringhurst Street, Station G, Philadelphia, Pa.

OPERATORS READ.

$5 outfit free to agents collecting small pictures to be enlarged into our beautiful portraits; fine watches given as premiums.

J. H. COBB & CO.,
305, 307 and 309 Broadway, New York.

TELEGRAPH OPERATORS WANTED.

A good chance to put extra dollars in your pocket, by taking Agency for our new book, the SPY OF THE REBELLION, by Allan Pinkerton, the Great Detective. Send for circulars and special terms.

K. S. V. RANDOLPH, Publisher,
315 Clifton Place, Brooklyn, N. Y.

TO INVENTORS.

I make a specialty of taking out patents for

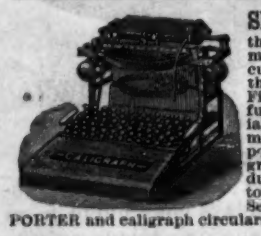
ELECTRICAL INVENTIONS

References and full information by mail on request. W. B. HALE, Solicitor of Patents.
Former First Ass't Examiner in charge of Class of Electricity, U. S. Patent Office.
Office, No. 614 F St., Washington, D. C.

BOOKS.

Descriptive Catalogue of Books relating to practical science—90 pages—and Catalogue of Electrical Books—12 pages—sent free by mail on application.

E. & F. N. SPON, 44 Murray St., N. Y.



Short-Hand Writing thoroughly taught by mail. Good situations procured all pupils when thoroughly competent. First-class stenographers furnished railroad officials without charge for my services. Correspondence solicited. Caligraphs sold. Special inducements offered operators and railroad officers. Send for COLLEGE REPORTER and caligraph circulars to W. G. CHAFFEE, Oswego, N. Y.

CEDAR TELEGRAPH POLES.

50,000 25s to 70s, No. 1 quality, deliverable on Mack. Div. M. C. R. R., F. & P. M. R. R. and C. S. & C. R. R.

HENRY C. RIPLEY,
East Saginaw, Mich.

CEDAR TELEGRAPH POLES.

LIGHT POLES FOR TELEPHONE LINES AND LONG POLES FOR CITY USE CONSTANTLY ON HAND.

50,000 Split Cedar Posts on Hand Ready for Immediate Delivery.

BROWNLEE & CO.,
Detroit, Mich.

HOLCOMB'S IMPROVED MECHANICAL TELEPHONES

FULLY PROTECTED BY FOUR VALID PATENTS.

(Patented in U. S. and Can.)

NEW Amplifying Telephones.

FOR PRIVATE LINES.

The latest and best. These new instruments embody recent and important improvements. They excel in *clearness* and *volume* of tone. The only *durable* and *reliable substitute* for the Electric Telephones. Highly commended by business men. Work two miles. Price, by express, $10 per set. TREBLE STEEL *wire* (the only durable wire for long lines) 5 cents per rod.

Improved Automatic Telephones,

(Patented in U. S. and Can.)

Excellent for short lines. They work finely and are the best instrument for the price now made. Elegant Ebony Enamel. Beautiful Metallic Base. Intended for practical business purposes; durable and efficient. None better for short lines. They are constructed on correct scientific principles. Do not confound them with amateur imitations. Price per set, by express, $5. Galvanic Wire, 3 cents per rod.

☞ These new instruments are unquestionably the best of their class. Thousands of them are in successful operation. *Beware of imitations and infringements.* Illustrated Circulars and numerous Testimonials from our patrons sent FREE on application. Address

Mention THE OPERATOR. THE HOLCOMB TELEPHONE CO., Atwater Block, Cleveland, O.

VOLTMETERS, AMMETERS,

With and Without Commutators,

CALIBRATED BY

PROFESSORS AYRTON AND PERRY, LONDON,

From stock, or ordered direct.

THE ELECTRICAL SUPPLY CO.,

Sole Agents for the United States,

109 LIBERTY STREET, NEW YORK.

WHITE CEDAR TELEGRAPH and TELEPHONE POLES AND CROSS ARMS.

We are prepared to furnish White Cedar Poles and Pine and Spruce Cross Arms, all lengths and sizes, and in any quantity, delivered on cars or at any point in New England at short notice.

Contracts taken for the building and equipping of telegraph and telephone lines anywhere in New England.

Correspondence solicited.

BARNES & SNOW,
P. O. Box 493. BANGOR, ME

THE ANSONIA

BRASS & COPPER CO.,

MANUFACTURERS OF

Pure Electric Copper Wire,

For Magnets, Telephones, Electric Lights, &c.

With H. Splitdorf's Patented Liquid Insulation, covered with Cotton or Silk.

LINE WIRE.

FIREPROOF HOUSE AND OFFICE WIRE FOR IN-DOOR USE IN ELECTRIC LIGHTING.
Wrought Metal Gangs, for Annunciators, Telephones, &c.

ZINC RODS, BATTERY COPPER, &c.
Nos. 19 and 21 Cliff St., NEW YORK.

EASTER CARDS.

Two new sets of Cards for Easter. Just out. For three three-cent stamps.

VERNON & CO.,
4 Murray Street, New York.

Prof. OTTO MAURER,

321 Bowery, near 2d street, New York City,
Only Manufacturer of and Dealer in
Fine Magical Apparatus,
for Professionals, Amateurs, and Children.
The requisite instruction is given with each purchase.
Send 10 cents for 60-page Illustrated Catalogue.

Telegraph and Telephone Poles

(Cedar, Spruce or Chestnut).

PINS AND BRACKETS

(Painted or Plain).

Construction of Tel. Lines.

GEO. Q. DOW, North Epping, N. H.

ELECTRICAL TEST INSTRUMENTS

MANUFACTURED BY

ELLIOTT BROS., LONDON,

From stock, or ordered direct.

THE ELECTRICAL SUPPLY CO.,
Sole Agents for the United States,
109 LIBERTY STREET, NEW YORK.

The Only One-Man Car Made.

The Patent Velocipede Hand Car.

Used on more than 150 Railroads.

Large Numbers Exported.

Runs Easily, is Durable and Capable of High Speed. Circulars and indorsements of prominent railroads sent on application.

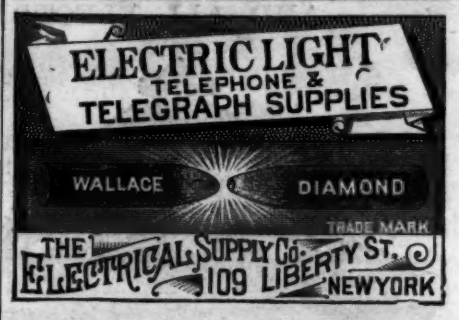
GEO. T. SHEFFIELD & CO.,
Sole Manufacturers,
Three Rivers, Mich.

SHORT-HAND WRITING THOROUGHLY taught by mail. Terms low; satisfaction guaranteed. Send stamp for circular and specimen of writing.
W. W. HULTON, Stenographer, Pittsburgh, Pa.

ESTABLISHED 1859.

PLATINUM.

H. M. RAYNOR,
25 BOND STREET, New York.



STANDARD ELECTRICAL WORKS

(Formerly POST & CO.),
CINCINNATI, O.,
LICENSED MANUFACTURERS OF

American Bell Telephone Company's

Magneto and Electro Call Bells, etc.

MANUFACTURERS OF all kinds of *Telephone Instruments*, Bells, Plugs, Switch Boards, Annunciator Drops, Spring Jacks, POST'S MAGNETO ENGINES for Switch Tables, and dealers in all kinds of **Telephone Supplies** and Tools; in stock and for sale at Lowest Prices.

Galvanized Line Wire, all numbers; Insulated Wire, all numbers; Insulators and Brackets, all sizes; Batteries, all kinds and sizes, at Lowest Rates.

POST'S STANDARD MAGNETO BELL. Open.

FULL ASSORTMENT OF
TELEGRAPH INSTRUMENTS.

Agents and Managers of Exchanges are requested to correspond with us before purchasing.

☞ We call special attention to our new improved **Post's Magneto Call Bells.** Samples sent on application to agents and exchanges.

STANDARD ELECTRICAL WORKS,
CINCINNATI, O.

THE UNITED STATES ELECTRIC LIGHTING COMPANY,

EQUITABLE BUILDING No. 120 BROADWAY, NEW YORK.

Complete Systems of Arc and Incandescent Electric Lighting Apparatus.

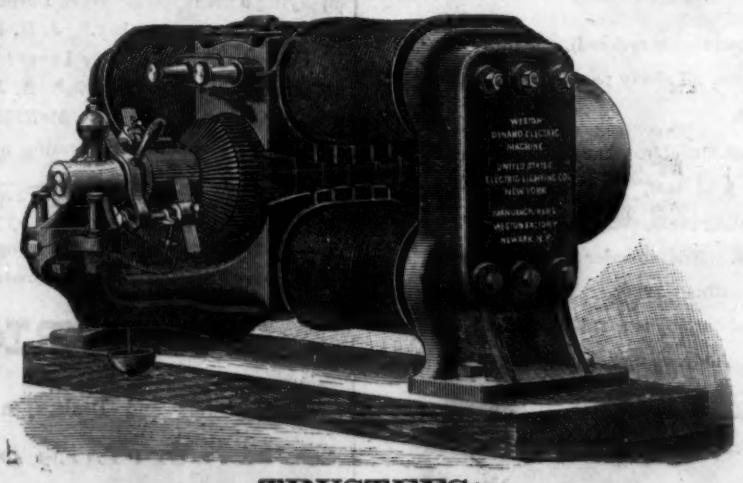
This Apparatus Combines the Highest Electrical Efficiency with the best Mechanical Design, and is unequaled for

ECONOMY, SAFETY,

SIMPLICITY

AND THE

QUALITY OF LIGHT PRODUCED.



DYNAMO MACHINES,
ELECTRIC MOTORS,
ARC LAMPS,
INCANDESCENT LAMPS,
STORAGE BATTERIES,
CARBONS, Etc., Etc.

Estimates Furnished on Application.

GEO. W. HEBARD, President.

M. HARTLEY, CHAS. R. FLINT,
A. P. STOKES, R. B. MINTURN,

TRUSTEES:

G. W. HEBARD, L. FITZGERALD,
H. B. HYDE, W. T. HATCH,

Send for Illustrated Catalogue.

L. E. CURTIS, Secretary.

T. H. HUBBARD, HENRY DAY
J. A. STEWART, L. E. CURTIS.